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VENTILATION AND HEATING IN CONFLICT.

Too Much of Either Destroys the Other.

A Topic of Vital Interest to Every Plumber and Steamfitter in the Country.

In this issue we have devoted considerable attention to the subject of ventilation, believing that ventilating practice in the future will be one of the opportunities for development of the business of the sanitary engineer. Articles on ventilation during the past few years have all been along stereotyped lines. So uniform have they been in their treatment that the reader might imagine until recently that the last word had been said on ventilation. During the past few months, however, a new school of ventilation has come into prominence. Its battle-cry has been "Fresh Air," and its weapon of warfare the columns of the popular magazines. Such is the strength of this new school that we have thought it wise and timely to present the views of its leaders, and we are to be congratulated on having secured for this purpose the excellent articles presented in this issue by Dr. W. A. Evans, Dr. W. E. Watt and William Henry Lynch.

The three chief subjects of modern sanitary importance are plumbing, heating and ventilating.

The knowledge of good plumbing practice has been developed to that degree that we can safely say that the only important weakness in national plumbing affairs is the lack of nation-wide application and enforcement of that knowledge. Plumbing practice may, and probably will, undergo radical changes during the course of years, but the underlying essentials of good plumbing have been demonstrated so fully that local errors of practice and code involve no serious menace to the general public health.

Heating we think we know. We say we know it because we have learned how to produce a certain temperature, maintain it and to some degree control it in residences, public buildings and factories. We can do this by means of open fires, stoves, furnaces, hot-air, hot-water or steam systems, using coal, gas

or electricity as fuel. Whether our modern heating methods mark the end of our ignorance or the beginning of our knowledge of heating truth will be known during the next ten years.

Ventilation should be a science and an art. It is now for the most part but a realized need.

Ventilation has been recognized as a need under certain conditions since the 17th century. Before that time, men had no particular reason to consider it as of importance, if indeed they considered it at all. Men spent the greater part of their lives in out-door pursuits; their dwellings were the playgrounds of drafts, which either committed suicide in the roaring log-fires or made their whistling and triumphant exit up the huge chimneys. Sewage-disposal was the need then. Ventilation they had and humidity thrown in.

On September 7th, 1677, Stephen Hales, in England, installed the first ventilating apparatus to obtain public recognition. It was designed to be applied to ventilation of hospitals, prisons, mines, etc. It was tried first in the Savoy Prison, London, where each year the death-roll was from 50 to 100 of its inmates. The Hales ventilator reduced this number to four persons the first year. It was the difference between ventilation of any kind and no ventilation at all.

All subsequent efforts at ventilation were confined to altering the sizes, position, construction and number of inlets or outlets or both. In the first attempt to ventilate the House of Commons by Desaguliers, the ducts were connected with the different fireplaces and by lighting this fire or that, the air could be pulled (so the inventor said) hither and thither at will. The man in charge of the system received the title of "Ventilator," and had to report to the Speaker every day for orders. The ventilation proved to be mostly of the "thither" type and the system was abandoned.

From 1677 to 1857 the history of the progress of ventilation can be described by zero. In 1857 in one of the "Leeds Lectures on Ventilation" appeared a statement to the effect that prominent physicians of that day maintained that one-half of the sickness and death was preventable by the securing of pure air and ventilation. The lecturer says: "But although they have said this and re-said it for the last 50 years, yet it has seemed a Herculean task to make the public at large comprehend it."

Another 50 years passed and in 1907 in one of the leading Chicago newspapers appeared the following statement:

"It has been asserted that there are not a dozen private houses in Chicago that are scientifically ventilated. Anybody of an observant turn of mind must have observed that none of the big office-buildings is ventilated save by the primitive method of raising the windows and creating drafts, thus the curse of impure air is upon nearly the whole population.

"At present nine-tenths of Chicago's people live in steam-heated boxes and work in other steam-heated boxes. That is what makes the mortality rate run up when the cold weather comes, in spite of the fact that winter should be the most healthful season of the year."

Consider this just a moment! A realized need 230 years old in 1907 and still a need at the close of 1910. Be sure that this loud calling for fresh air is a protest against modern systems of heating and ventilation in combination. No matter how dogmatic the statements of the text-books on ventilation in which they arbitrarily state ventilation essentials, the more we investigate the statements made, the less we are able to reconcile them with the facts that we know.

For instance, one of the leading text-books says that each person needs 3,000 cu. ft. of air per hour, in order that he may live in an inside atmosphere of standard purity. The same text-book says that the air in a room changes completely in one hour through loss by leakage. This sounds good on paper. Let us take an ordinary bed room 11x11x10 ft. This contains 1,210 cu. ft. of air. Let us assume that two persons occupy this room for sleeping purposes, retiring at 11 p. m. and rising at 7 a. m. and the door being kept shut. During those eight hours there is no disturbance of air-condition. Quoting the text-book, these two people need 48,000 cu. ft. of air; according to the same text-book the air changes once each hour, and they are therefore only supplied with 9,680 cu. ft. They are therefore short 38,320 cu. ft., or short 80 per cent! We are well aware, of course, that contention may be made that sleeping persons do not require as much air as people who are awake, but this text-book does not say so. Another text-book claims that only 1,000 cu. ft. are necessary per person per hour, but this still leaves a shortage of over 6,000 cu. ft.

Dr. Watt, speaking recently, stated that if the children in the public schools took in all the air that they were supposed to require they would rise to the ceiling and explode with a loud noise.

These statements are merely made to show the chaotic state of ventilation at the present time. We leave the reader the pleasure of reading an amplified presentation of the subject from different points of view as given in the excellent papers published in this issue.

One thing is certain and that is, the air as furnished by Nature to man must necessarily be considered the working standard of quality. Furthermore, it has been established, apparently beyond a question, that heating air by artificial means de-

vitalizes it, or robs it of something which it originally possessed, and which was of an energizing character.

The efforts of the new school to secure ventilation are antagonistic to modern heating practices. There is an opportunity now offered for those who will give time and study to the subject to reconcile the differences that exist between the diverse heating and ventilating methods and to evolve for the public benefit a system by means of which heating and ventilation will be under perfect control at all times and will be provided each for its own sake.

Someone will undertake this work. Where there is a public demand you may be sure there will soon be a source of supply. The natural and logical purveyors of ventilation should be the heating engineers of the country.

Plumbers and steamfitters will be called upon in their combined work to consider the ventilation of residences as a result of this crusade for air-purity. We invite your careful attention to the points raised in the articles presented and will be glad to consider and publish comments on the subject from our readers.

How does this editorial and these articles affect you? Answer this question: Suppose this new school continues to gain as it is doing. In your next school-job you are asked to figure on heating the building, which is to be run by disciples of the fresh-air school. They may ask you to figure on the ventilation. They may not, but in any case, you know that the open-window policy will prevail and a plenum-system is not available. How will you figure then? Is it not worth your while to study ventilation problems now?

NEW ENGLAND NEWS.

Doherty & Freeman, Bridgeport, Conn., have the contract for the plumbing in the three-family house which is to be erected on Berkshire avenue for Samuel Dawe. The apartments will contain five rooms and bath each, and will be fitted with set tubs and open plumbing and all other modern sanitary conveniences. This firm also has a contract to do the plumbing for a similar house to be erected for the same party but by a different general contractor.

Among the contracts which C. S. Eames & Co., Bridgeport, Conn., have on hand at the present time are the following: plumbing and heating in a three-family house on Keeler avenue for Gertrude S. Terry; plumbing and heating in residence being erected for R. C. Seeley on Brooklawn avenue; similar work in residence being erected for W. E. Seeley, also on Brooklawn avenue. These contracts have all been signed within a few days.

The contract for installing a bath-room and other plumbing fixtures in a fire station at Bangor, Me., has been awarded to Fairbanks Bros., of that city. They were the lowest of several bidders.

J. Reilly, Jr., Bridgeport, Conn., has the contract for plumbing in connection with extensive changes and alterations that are to be made in the residence of Andrew Radel on Washington avenue in that city.

W. J. Snadecki, Bridgeport, Conn., has been given the contract for plumbing and heating four houses, which are soon to be erected on Wilmot avenue in that city for Clark Wilcox of Milford, Conn. Each house will be arranged for two families with separate bath-rooms and heating plants. Mr. Snadecki also has the contract for plumbing and hot-air heating in a new apartment house which is to be erected on Eaton street, Bridgeport, for Francis Sammis.

Plans have been completed for the plumbing and heating changes in the building at the corner of Church and George streets, New Haven, Conn., for A. F. and J. P. Wood, and estimates will be called for at once. The changes to be made in this building will cost in the vicinity of $30,000.

L. W. Taylor & Co., manufacturers of heating and ventilating apparatus at 37 Haverhill St., Boston, sufferred slight damage from fire a few days ago. The fire was on the upper floors of the building but smoke and water filtered down through the building.

A contract for plumbing in a three-family house which Mrs. Katherine Jackson is having erected on Park street, Bridgeport, Conn., has been placed with A. E. Roberts.

Work has been started on a new house at Tokeneke park, Norwalk, Conn., for Mrs. Garrett Smith in that city, and the plumbing contract has been let to Jones & Hotchkiss. Other sub-contracts have yet to be awarded.

Buchan & McNally, Andover, Mass., have been given the contract for heating the new Barnard block, the construction of which has just been started in Central square.

A. J. Clerkin, New Haven, Conn., has taken the contract for the plumbing and metal work on a six-family house which is to be erected on Pine street, New Haven, for M. J. Bryne. The house will be modern in every particular.

The Heating and Plumbing Co., Norwalk, Conn., has been awarded the contract for the plumbing, heating and roofing of a new residence for P. W. Brooks on West Rocks road in that town. The erection of the building has been started.

The court of Burgesses, Wallingford, Conn., has appointed Edward J. Gunner to the office of plumbing inspector in that town.

Frederick J. Wolfel, New Canaan, Conn., has a contract for installing a new heating plant in the greenhouses of John B. Gerrish in that town. Mr. Wolfel also has the contract for plumbing and heating at the H. B. Thayer residence at Silver Mine, Conn.

The following contracts have recently been let at New Haven, Conn.: To H. Krevet for plumbing and heating in two apartment houses to be erected on Chatham street; to T. W. Corbett for plumbing and gasfitting in the chapel of the First Ecclesiastical Society on Temple street; to the Foskett & Bishop Co., for plumbing the residence of Professor Ross G. Harrison on Huntington street.

Joseph H. Brown, a well known Norwalk, Conn., plumber, who has an establishment on South Main street, is erecting a shop at the rear of his residence on Taylor avenue. The building will be two stories in height and will be an up-to-date plumbing establishment in every way.

The contract for plumbing in J. E. Kefford's new six apartment block on Hopkins street, Waterbury, Conn., has been awarded to F. F. Garrity of that town.

Work is progressing rapidly at the residence of Stewart Smith at Roton Hill, Stamford, Conn., where extensive alterations are being made. The plumbing contract is being cared for by Charles Thompson and the heating by Murray & Richards.

A movement has been started among the building trades of Meriden, Conn., for the creation of the office of building inspector, the plan being to combine the duties of plumbing inspector and fire marshal with those of the inspector of building. This would make an office which could pay a salary commensurate with the services of a competent man. An amendment to the city charter embodying the proposed change will probably be introduced in the city council within a few days.

Plumbing Inspector George A. Simmons of Pawtucket, R. I., whose salary is but $150 per year, has been allowed an additional $150 for the past year because of the large increase in the amount of inspection work. Only two members of the common council opposed the appropriation of the additional sum when the matter came before that body. Both, however, admitted that the work was worth the extra money. Inspector Simmons figures that at the salary of $150 allowed him by the ordinance he would receive an average of ten cents an hour for the time he put in on the city's work while in some instances his own men have stood idle awaiting him.

A PRACTICAL MANUAL OF STEAM & HOT-WATER HEATING

BY EDWARD RICHMOND PIERCE

Mr. Pierce shows in this section the chaotic condition of the Cast-iron Boiler ratings. He shows clearly why this lack of satisfactory method of making tests for ratings exists, and that it is NO LONGER A QUESTION FOR A FEW BOILER PRODUCERS. IT IS A VITAL MATTER CONCERNING THE POCKET BOOK OF EVERY HOUSE HEATING CONTRACTOR IN THE ENTIRE COUNTRY.

SECTION XXXI.

It is probable that there is no great difference among the various tables that have been prepared as to the heating value in B. t. u. per pound of combustible, however much they may vary as to ash, moisture, fixed carbon and the rest. These variations come from individual or special samples usually. What the fitter needs to do is to get from the dealers in the territory he covers the complete analyses of the coal handled therein. From these he can make his own deductions as to the size of firepot that will be required for different coal, always starting from the value given in B. t. u. for one pound of combustible, and deducting for ash according to the size of coal to be used. Allowance should be made for a larger percentage of ash in small sizes than for the large. There should always be a liberal factor of safety added to the theoretical space as determined from the published analysis.

In the matter of grates for boilers there is no reason why any of the grates now on the market should not be taken, if the firepot and other important things are suitable to the work to be done.

The matter of fire or heating surface is not by any means a settled question. It is only within a very short time that any real data on the value of the various items that go to make up the cast-iron heating boilers has been presented by independent investigators. In fact, the only attempt at standardizing seems to have been the fixing of the relative temperature that a hot-water boiler should show, as the correct temperature of water at the boiler, to secure a rating for radiation with 65 per cent increase over that given for the same construction and size of steam-boiler when rated for steam at 2 lb. at the boiler; and the rating of steam-boilers as carrying 2-lb. pressure at the boiler.

From the individual tests that have been made on nearly every type of cast-iron heating boilers, it is quite well demonstrated that, in a general way, the same law that governs the value of heating surface in tubular boilers obtains with equal force when considering the cast-iron surface.

But the roughness of the flues, in the cast-iron construction, tends to develop somewhat larger losses because of the quick accumulation of soot when soft coal is used as fuel, particularly when there is an excess of indirect flue surface. The tendency of this surface to collect ash when anthracite coal is used seems also to be more pronounced in the cast-iron flue.

The tests of the United States Geological Survey at St. Louis, Mo., and of the Engineering Experiment Station of the University of Illinois as published in bulletin No. 366 of U. S. G. S., and bulletin No. 31, of the University of Illinois, Feb., 1909, are practically the first attempts, by outside engineers of high standing, to test cast-iron house-heating boilers on a somewhat prolonged basis.

These tests are far from complete, they having been made to determine the heating value of various fuels when burned in the cast-iron house-heating boiler. The tests, however, disclose incidentally many things beside the coal-value that are of importance to the student of the heating question as it relates to the house-heating problem.

In order to emphasize what has already been said in regard to the general lack of information in the trade of proper data upon which to base anything like an accurate estimate of the various estimates and claims of the different manufacturers, I quote a few paragraphs from the bulletin No. 31 of the University of Illinois, dated Feb. 22, 1909.

"Page 9.—On account of the small amount of available information relative to a satisfactory method for conducting house-heating boiler tests, one of the principal purposes in conducting these tests was to obtain information that would assist in developing such a method. Fuel-tests with house-heating boilers will of necessity be similar, in many respects, to the tests made in connection with power-boilers."

"Page 11.—In the case of a house-heating boiler, the question relative to capacity which is of importance, is how many square feet of radiation can be served through comparatively long periods of time without attention, except at the time of firing. It is generally desired to know how many square feet of radiation can be served through a period of from six to eight hours without attention during that time. The same amount of fuel consumed within a short time should serve more radiating surface per hour than when burned during a longer period of time. The one-hour period as employed in defining a horse-power, and as used in rating power-boilers, is not satisfactory for comparative purposes in connection with house-heating boiler-work. In this kind of work, then, in order that information relative to capacity may have the greatest usefulness, it should be based upon the evaporation which can be obtained during a period of from six to eight hours without attention, rather than upon the evaporation obtained in one hour with whatever attention may be required. Thus a boiler rated at 1,000 sq. ft. should be capable of serving that amount of radiation for a period of at least six hours without attention during that time.

"Page 12.—The lack of a satisfactory method of making tests, or of one generally accepted as such was apparent. Under these circumstances it was deemed advisable to

make a series of tests according to the American Society of Mechanical Engineers' code for conducting boiler-trials.

"Page 14.—Societies and individuals interested in this kind of work have from time to time reported tests, or discussed methods for making such tests, but apparently without making definite recommendations that have been found satisfactory for the guidance of others, or that have been adopted generally enough to make comparisons possible or of value. The number of tests of this kind which have been reported is surprisingly small as compared with the number of tests conducted upon power-boilers. Probably the greatest amount of work in this line has been done by the manufacturers of heating apparatus. The results of their investigations are, however, either not available, or are applicable to particular makes."

When a great university, as recently as 1909, finds itself utterly unable to find, even among the house-heating boiler-manufacturers of this country, a method of testing cast-iron heating boilers that was even in general use among themselves, it is not a matter of great surprise that the trade have up to the present time no general knowledge of the important points that they should investigate when selecting a boiler. The time has now come, however, when the intelligent engineer and steam-fitter must, in justice to himself, require from the manufacturer the data already indicated in this discussion, and those of the trade who are in the fair way to secure work upon a larger scale than residence-heating, will naturally require considerable data in addition.

The authorities at the University of Illinois were justified in taking the code of the A. S. M. E. fuel-tests for power-boilers as the guide for testing cast-iron boilers for house-heating. In this they only followed the example which the United States Engineers set two or three years previously when making similar tests at St. Louis, Mo.

Undoubtedly one of the chief reasons that neither of these parties found any satisfactory rule among the cast-iron boiler-manufacturers of the country was the fact that nearly every boiler on the market from 1860 to, within perhaps ten years, or 1900, which was made of cast iron, was some sort of an attempt to improve upon the Brayton boiler; if not that, then the Mills or Gold, in the vertical sectional type, while in the round horizontal sectional type, the boilers without an exception, were either direct copies of foreign boilers without variation, or were adaptations of the upright tubular boiler of the high-pressure type. In a majority of cases the manufacture of the house-heating boilers, especially of the cast-iron ones, was entered into by some foundryman who saw a chance to increase his output of castings by slightly changing his patterns from those of some type of boiler within his knowledge that was giving a fair degree of satisfaction. When it came to rating the boiler, the foundryman, with characteristic American confidence, determined that, if the model that he had chosen to improve upon had given a rating, then he could safely rate his production at the same, or a trifle more, according to the disposition of the manufacturer.

That a test along the plain, simple lines indicated in table HZ of this series was made prior to 1900 is very doubtful. It is also a well-known fact that the results of any tests made by any of the boiler-manufacturers who cater to the house-heating trade have never been given out in a form that would enable one to promptly and easily determine the value of the boiler when placed under conditions that varied from those under which the manufacturer may have placed his boiler and secured what he was pleased to call its rating. Another reason why the manufacturers have never had a simple straightforward rule for the testing of cast-iron heating boilers is the fact already stated that their product was almost universally sold through agencies. As a rule, only one make of boiler would be allowed to one agent. The manufacturer usually made all the plans, and decided what size of boiler should go on a given job. There was no pinning the job down to a 2-lb.-pressure-at-the-boiler proposition. If a job would not give out heat enough with 2 lb. at gage, "fire a little harder and carry more pressure. The boiler is safe; burn a little fuel."

There is not a man in the trade today who can remember back 10 years who will say the statement just made is overdrawn. But when the trade at large had become somewhat acquainted with the general practice of steam-heating for residences, and the public were getting particular as to the pressure to be carried, and the amount of coal to be burned, the manufacturers decided that the modern practice had developed to a point where steam-jobs were being installed at times, and probably could always be installed in residences, and give satisfaction if only 2-lb. pressure was carried at the boiler.

This was a condition of economy and safety for the house-owner much to be desired. It would also, it was thought, simplify boiler-ratings by bringing all boilers to the same standard of 2 lb. at the boiler on all house-heating boilers. A few of the larger producers began to rate on this basis, and in a short time the manufacturers as a body had adopted the new rating. Practically coincident with this move, came the almost universal cessation on the part of the large producers of drawing plans for, or the laying out of house-heating jobs. These steps which have been taken by the boiler-manufacturers within a very short period of time: i. e., doing away with the agency system, stopping plan-making, and adopting a definite stated pressure as a basis of rating: have had the effect of calling the attention of the United States Departmental Officers and engineers to the question.

The first thing that they found out was, that there was no actual standard in effect which governed the rating of cast-iron heating boilers such as were used in residences. The next thing was, that of those manufacturers who pretended to have a system of scientific rating, no two of them were alike, or agreed in full with each other as to the value of things upon which they did agree as being important.

Power-boiler data, at the time of the Centennial Exhibition at Philadelphia, was found to be in this same guess-work sort of a condition, and it became necessary to formulate a code for testing power-boilers. This code, with certain corrections and additions, became what is now known as the Testing Code of the A. S. M. E. for Power Boilers.

There is no great exhibition to require the making of a code for testing house-heating boilers, but there is a still more important reason that requires such a code, and that it shall be settled upon quickly, and correctly, and above all simply. **And that reason is that, with the taking of the successive steps just referred to, the steam-fitter and the engineer have had all the burden of performance thrown on to them.** The manufacturer is out from that. It is no longer a question for a few boiler-producers. It is a vital matter concerning the pocket-book of every house-heating contractor in the entire country.

(To be continued.)

Ventilation

By W. A. Evans, M. D., Commissioner of Health, Chicago.

Plumbers, Who Had the Pleasure of Hearing Dr. Evans Speak at Their National Convention in Chicago This Year, Know How Forceful He Is, and Will Appreciate the Power Behind the Pen. He is Distinctly a Leader in Sanitary Thought.

It is an established fact that good drainage and good protection of the water-supply against pollution will materially reduce the typhoid death-rate. In Chicago it has been reduced until now it does not exceed one-fifteenth of what it once was. There is an axiom that a purified water-supply will save three lives from other causes of death for every one which it saves from typhoid fever. For example: In 1908 338 people died in Chicago from typhoid fever; in 1909 the number was 268. Gradual diversion of the sewage, let us say, had saved 70 lives from typhoid fever, and, according to this law, a saving of 210 lives from other causes that went with it. For this there were several causes; along with typhoid bacilli there go other disease-producing bacteria; in addition, the use of polluted water makes infection possible by lowering resistance.

In Chicago 31,000 people die each year; 10,000 die from diseases due to bad air. When we compare the 268 dying of typhoid fever with this 10,000, we realize the importance of good air. The harm of bad air is due in part to air-borne infections, say, colds, a parallel with typhoid fever; it is due in part to lowered resistance, the same principle as in the collateral harm of polluted water. Therefore we must fight and work for better air-conditions than now prevail. It is not enough to keep our standards and our practices from slipping back. It is necessary that they should advance.

Material harm has been done from lack of exact information. **We might almost say, speaking of accurate information, that there is no knowledge on ventilation.** Until this is remedied every one feels that he has the right to surmise. Some of these opinions will be of very great value; some of them will be without value, and some of them will do harm. It will be difficult for one to find the proper value of these opinions. If the person giving the opinion has any device or method to sell, his opinion will be discounted. We sometimes go too far in this particular and refuse to give a proper value to an opinion merely because the person advocating it is pushing some device or method. Of course, aside from this motive, the value of opinions varies widely.

As illustrating the harm which some of these opinions have caused, we have the harm which has resulted from a species of human being now rapidly becoming extinct —the "draft crank." He started with some correct scientific information, a little bit of truth as to method of infection. He took this into his self-centered mind and out of it he evolved a form of short-sighted selfishness known as the "draft crank." In his concept the correct etiologic principle with which he started has been so enlarged and modified that in its present form it is not a truth. As he is passing away, this amount of space may not have been needed. In his wake there is following a pernicious practice which should be combated. It is the demand for still air.

In order that air should be comfortable and healthful it is necessary that attention be concentrated on two localities—the breathing zone and what Sedgwick calls the aerial envelope.

The air in the breathing zone is warmed by the human exhalations. By them it is made moist and is charged with CO_2 and organic matter. Diffusion is relatively slow. It is slower than respiration. Therefore there must be some force which is more rapid than diffusion which must be used to keep this zone clean enough for comfort and health. If the temperature of the room is kept at 68° or below, the difference between the specific gravity of the expired air and that of the surroundings is great enough to supply this force and the breathing zone is kept fairly clean.

The aerial envelope (aside from that around the head) is the air which is in contact with the skin. It is warm and moist and charged with body-waste. Pflügge and his pupils have shown that, kept in contact with the body, it harms it. For the purposes of this discussion, it does not matter whether the harm comes from the heat, the moisture or the chemical content.

Such air, being warmed, tends to rise. If the temperature of the room is 68 deg. or below (better below) it will rise and be replaced by fresh air.

Whenever the temperature of the room goes above 68 deg., the difference between that temperature and the temperature of the aerial envelope does not furnish force enough to disengage the air from under the clothes and in the mesh of the fabrics. Therefore whenever we heat up the temperature of the room, we lose the great natural moving force. Somewhere around a room temperature of 70 deg. is the point where this force gets so slight as to leave us floundering. How is it to be supplied?

The best solution and at the same time the most economical is to have the air moving from the inlets to the outlets with the nearest possible evenness of flow; even as to direction; even as to velocity. If the air can be kept moving with a fair degree of uniformity from a few inlets to a few outlets with a minimizing of cross-currents, the present air requirement of 3,000 cu. ft. per inhabitant could be reduced to, say, 1,000, and thus saving be made in heating and handling.

The second best thing and, with existing installations, about the only thing is to make use of fans.

It has been demonstrated that fans in a room increase its general CO_2 and dust-content. At the same time they decrease the CO_2 and other exhalation-products in the air that is immediately around the nose of the inhabitant, and that is the great, important thing. The hottest air is always that which is in contact with the body. When a man complains of the heat in a room, that which he complains of is the heat of the air within his aerial envelope. Fans, in blowing this air away from his body, substitute it with new air which is cooler.

In other words, fans supply the force which was lost when the outside air began to warm up. Therefore fans are of great service in ventilation, even though they but churn up the air which is in the room.

In such installations, fans should be run in the winter time as well as in the summer.

Yesterday I sat in a large room as one of an audience of 200. The wall thermometer registered 76 deg. The air was introduced at the ceiling and taken out at the floor. The audience was "gappy," yawny," inattentive, mentally sluggish, and felt oppressed, I think; at least one did.

The air was morgue-like in its stillness. That situation would have been greatly improved by some fans agitating the air and supplying currents to clean out the breathing zones and to reduce the aerial envelopes from 90 to 76 deg.; not perfect, but an improvement.

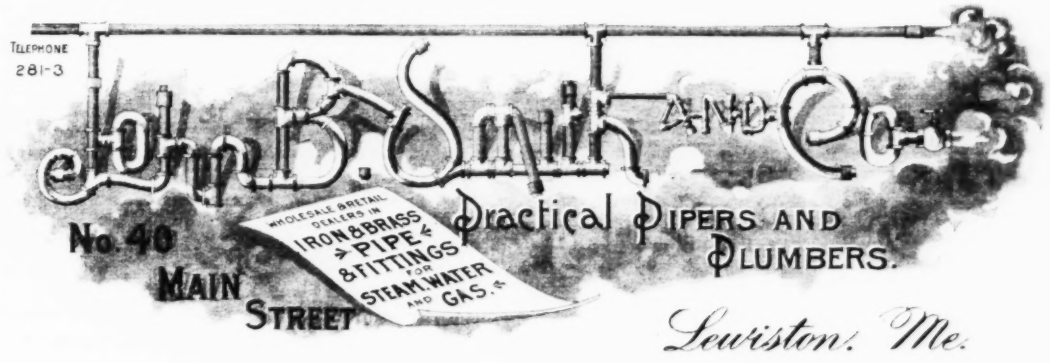
Therefore let us have more currents, more agitation, less stillness. If we are going to raise the temperature above 65 deg. and thus lose the cleaning force of material temperature-differences, we must substitute some other air-moving force which is stronger and more rapid than diffusion, or suffer the consequences.

It is to be borne in mind that agitation of the air, while it purifies the breathing zone and the aerial envelope, makes the general air average higher in pollution. Therefore the above arguments for air-agitation cannot be construed as arguments for recirculation of air in the trade use of that word. Ventilation of a room demands that fresh air should be taken into the room and foul air should be taken out. **To conduct the air of a room through a heater and back into the room is not ventilation.** It may be a satisfactory method of heating, and if provision is made for the constant taking in of fresh air and the expulsion of foul, we could say that a system of ventilation had been combined with a heating system.

This article has dealt with a few phases of ventilation. I hope that we are beginning to understand that ventilation has many phases. **If we consider that putting a certain per-capita-volume of air into a room constitutes ventilation, we will make many mistakes.** There should be standards along the following phases: Temperature, humidity, CO_2, volume of air, currents (embracing inlets and outlets), dust, and, in time, bacterial impurities.

AN ATTRACTIVE LETTER-HEAD.

We take pleasure in reproducing this week an attractive letter-head which effectively symbolizes the industrial activity of John B. Smith & Co., 40 Main St., Lewiston, Me. We might state that owing to photographic difficulties, the illustration does not possess the strength of the original one but it gives a very good idea of its practical character.



Here is a definite case in which originality and art are combined in such a way that the main issue is not lost sight of. It is manifestly impossible for any one to receive a letter from John B. Smith & Co. and not remember the unique style of letter-head adopted by this company. The connections of the letters are ingenious and bear out the truth of the legend that members of the company are "practical pipers and plumbers." If any of our readers are interested in improving their letter-heads, we will be very glad to take up the matter in detail with them and give them suggestions and assistance without charge.

THE PROPOSED AMENDMENT TO NEW YORK STATE VENTILATION LAW.

A conference between Webster B. Mabie, of Webster B. Mabie & Co., real-estate operators; D. D. Kimball, chairman of the special committee of the American Society of Heating and Ventilating Engineers, and others, was held on Tuesday and Wednesday of last week at 437 Fifth Ave., New York City, for the purpose of discussing the proposed amendment to the New York State Labor Law in its reference to factory ventilation. Counsel was present representing the real-estate interests, and the proposed law was thoroughly analyzed by Commissioner John Williams of the Department of Labor.

Commissioner Williams has promised to have a conference with the ventilating engineers and the real-estate interests some time this month, probably on or about Dec. 21, at which time he will hear the views of the real-estate owners as to whether they want the law to hold the owner responsible for the installation and maintenance of the ventilating equipment; whether the law shall state that the landlord shall install the equipment and make the occupier responsible for its operation, or whether the occupier should install and maintain the apparatus.

An effort has been made during the last month to induce the real-estate men to meet with the engineers for the purposes of formulating a bill that will meet the requirements of the law and at the same time prescribe who shall be responsible for it. The real-estate interests have so far held aloof as they did when the tenement-house law, which has proved a severe burden to many owners, was being drafted. It is only recently that they have been induced even to take an interest in this legislation, and not until Webster B. Mabie took the initiative did they come forward.

Another element of uncertainty in the proposed bill is that of the standard of purity. The Commissioner of Labor wants the standard placed at 15 parts of carbon dioxide in 10,000 parts of air. The ventilating engineers are rather inclined to a standard of 2,000 cu. ft. of air per hour for every individual working in or for every gas jet in use in a loft or factory.

Another meeting probably will be held next week, when more real-estate interests, which have been invited to take part in this discussion, will be present.

"It Pays to Advertise."

It happened in Topeka. Three clothing stores are on the same block. One morning the middle proprietor saw to the right of him a big sign, "Bankrupt Sale," and to the left, "Closing Out at Cost." Twenty minutes later there appeared over his own door in larger letters, "Main Entrance."—Everybody's.

Two things you should do. Read the editorial and articles on ventilation and frame the Christmas cartoon. Did you get a biplane like that this year?

A PLUMBER'S DIARY

BY PHOENIX

XXVI.

Some Experiences as a Collector.

I think that the sewing-machine agent and the piano man have got it on the plumber when it comes to collecting. The plumber can't remove his goods and can only cuss a bit at the bad luck, or perhaps sue for the bill, and you know about how much good that suit-business does in the general run of cases.

It is wonderful how the feeling seems to change when it is time to settle up, at least in some instances. You know that you go along a-putting in the job and everything is all "honey and pie." The cook gets friendly and brings around a mighty fine hand-out quite frequently, and the owner taps the cider barrel, if it happens to be the right time of the year; or perhaps he has something that was "bottled in '72."

You certainly live fine for 10 days, may be two weeks. Then the job is completed and tested out and found to be all Okay, and it becomes necessary for the owner to show the color of his money. We don't "irrigate" any more from this point on. That is "why I thought that the parlor radiator was to have 10 sections in it. There are only eight, for I just counted them." When you explain that you used a higher radiator because it fitted the place much better and that the higher radiator has in it three feet more of radiation than the 10-loop style, the extra three feet you are making no charge for whatever, the lady of the house looks at you in a frozen manner and perhaps intimates that you are a robber.

"I thought that there were to be marble bases for the radiators instead of wooden ones." That's another kick that comes out quite frequently, and when you pull out the contract and point to the specification, which calls for hard wood bases, she says: "Well, Mrs. Jones has marble under her radiators and it looks fine. We paid enough for this job to have the same, the Lord only knows." Comforting, is it not?

"That ain't a five-foot bath-tub. It's only a four-foot." Still another song that is sung on the settlement occasion. It is enough to make a man throw cabbages at his grandmother. Thank goodness that all people are not of that variety. "Well, I'll pay it now all but $25, and I won't pay that until I have tested the job." You feel like saying—well, I'll not mention it, for most of us know full-well the feeling.

This condition simply comes from the great amount of unreliable work that has, from time to time, been foisted upon people. Both the innocent and the guilty have to suffer for it. There is really no more reason why the plumber should leave an insurance of from $25 to $50 in the hands of the customer than there would be in the case of the mason, the painter or the butcher.

A couple of cases come to my mind, one showing the spirit on the part of the customer; the other neglect on the master's side. Case number one runs as follows:

The time was several years ago and early in the evening of the fall of that year.

The place was a small city located some distance from the part of the country from which I am writing.

The girl was rather aged, somewhere along about 60, rich, without a chick or child and only her self to please, for, be it said, she owned the bank roll, and the husband was small potatoes.

So there you have the setting all rigged to the queen's taste. Enter the villain (which I am) with a bill to collect, carefully concealed in my pocket. The heating job for this old dame had been completed for many weeks and she had been holding out nearly $100 on the grounds that she wanted to see "how the job was going to work." I desire to state that it was a first-class plant in every particular and for a period of more than 10 years after its installation they never paid out one cent for repairs.

After a few pleasant joshes about riches taking wings and the wealth of the plumber, I presented the bill for the balance due and she refused to pay the same. Went through the usual amount of fault-finding, at which point I headed her every time and then she came out flat-footed and said that she would hold up the balance for six months more.

"Use tact," they say. Did you ever have to bottle up your wrath and spread on the molasses when you wanted to get up and take irritating people by the nap of the neck and shake the liver out of them? **That was it right here.** But I argued matters with her, stuck to it and did not leave the premises. I stayed it out until after midnight, and when I left the check for the whole amount reposed in my pocket.

The second instance relates to a case where the master was entirely in the wrong. I happened to be in a shop one day and the master said to me: "Old boy, what kind of a collector are you?" Try me," I answered. "Well, here is a bill against Mr. X that has not been collected and somehow it hangs fire. There is a "V" in it for you if you bring in a check for the whole amount."

I took the bill and went out to the residence. Got the owner to the door and told him that I had heard that he had a mighty fine steam job and that I wanted to see it. He went straight up. You should have heard him give it to the master. I wanted (then) to know what was the matter. I found out in short order. The automatic damper was on "hind-side to." It took me just about five minutes to fix it and then I presented the bill which I got after a few moments' argument. That master had never been on the job to settle up. Always left it to some one else, and the fitter had never been to the job since it had been completed.

Some customers will kick anyway (it's human nature), but it's best to give them as little chance as possible, and the more you submit to having them hold out on you, the more you may have to do it, and the harder the bills will be to collect, for it seems, sometimes, to customers, as if it were paying for a dead horse.

No! "Humdinger" is not in the dictionary. Our stenographer looked it up. It will be after our December 31st issue.

The Air We Breathe

How Vitality Comes from It and What Deteriorates It.

By William E. Watt, A.M., Ph.D., Editor the "World's Chronicle," Chicago.

You May Think You Are Not Interested in Ventilation. You Will be Interested After You Have Read This Article. Dr. Watt Speaks to "Domestic Engineering" Readers in no Uncertain Terms. Every Word Shows the Bigness of the Man and the Powerful Brain that Conceived It.

Two important ideas we learned at school are wrong. They are still in the high school text-books and in most of the college texts on physiology, physics, and chemistry. One of these is that carbonic-acid gas, as we used to call it, or carbon dioxide, as it is now styled, is very dangerous to life; the other is that we breathe for the purpose of taking in oxygen.

Carbon dioxide is a gas which has long been considered quite poisonous and the cause of many deaths as well as many declines in health by those who are obliged to breathe air which is not sufficiently renewed to get the percentage of carbon dioxide very low. Our ventilating systems are all built on the supposition that carbon dioxide, mixed with the air to the amount of from four to six parts to the thousand, is not harmful, but when six is passed it is dangerous. **Within the past few months it has been demonstrated that a man may live in air that is pure mixed with good carbon dioxide to the limit of four parts in the hundred and feel no bad results.**

The truth is that carbon dioxide is present in all the air we breathe, as a rule, sometimes more and sometimes less, but without doing us any particular harm. Carbon monoxide is a dangerous poison and exists in the air that has been contaminated by many breathings. But this gas is not so easy to detect with a little lime-water test, and so it is neglected by most ventilating engineers as a matter of little moment.

There is another fallacy about carbon dioxide which I may as well touch upon here. It is the idea that it is much heavier than air. This is not so. When cold it is heavier, but not enough to make much difference in calculations regarding its presence or absence in the air at any time or its separation from the rest of the air. The air is a mixture, not a chemical union of gases. It contains nitrogen, which is popularly supposed to do nothing at all in our lungs, a very grave error which would require another paper to explode. It contains oxygen, the gas which builds worlds and which is supposed to be the very quintessence of life, the thing for which we breathe air. There are two sorts of oxygen, one energized and active, and the other inert and dead. **Air may be perfectly pure as to its ingredients and yet the oxygen in it be so dead that it does not energize the one who breathes it,** but merely supports a low state of life which resembles vitality much as embers resemble incandescense.

Besides oxygen and nitrogen, the air contains steam and carbon dioxide. The carbon dioxide is heavier than oxygen and heavier than nitrogen, but the three are so nearly balanced in weight that they do not separate. You may find them all in the bottom of a well or on the top of a mountain. It is true that at times you find a great deal of carbon dioxide at the bottom of a well and it lies there inert and cold and cannot get out. But if you were to warm it up to 30 deg. above the temperature of the air in the well, the carbon dioxide would climb right out and leave the hole to the pure air.

When I say there is steam in the air, I mean steam. I do not mean that sort of vapor of water which you can see a little way out from the nose of the tea-kettle. I mean the invisible, dry steam which is between the vapor and the nose of the kettle. A certain amount of true steam is in the air at all times whether at zero or at the temperature of ordinary boiling water. You know you can boil water in a partial vacuum at a much lower temperature than in an open pot. Remove pressure sufficiently from the surface of the water and you can boil it by rubbing an icicle against the outside of the vacuum-dish. It will boil at 20 deg. below zero Fahrenheit and produce true steam.

William E. Watt, A. M., Ph. D.

Now these four substances or gases are in the air we breathe regularly unless some special power has removed one of them. You can have air with more or less of any one of these and it will still be air, as a mixture of peas and beans will still be peas and beans if we add more beans, or take out some of either. An odd thing about steam is that when it is heated to about 50 deg. F., it becomes considerably contracted in volume and seeks other steam to fill the steam-vacuum. **When air is warmed for house-warming, if it is not supplied with steam as its temperature rises it will take steam out of every living thing in its reach.** Its attack on the breathing tract is so fierce that coughs, colds, catarrh, sore throat, pneumonia, grippe, swollen tonsils, and adenoids are produced. These house-diseases are not to be blamed upon the house itself. They are called foul-air diseases, but that is partially wrong, for they are steam-vacuum dis-

eases, and when the right air is breathed by a patient suffering with any one of these diseases, unless he is too far gone, he recovers, beginning to mend almost instantly when the right air strikes his lungs.

Because humidity cures these ills, and because the person breathing air with a steam-vacuum in it lacks vitality and efficiency, I have been able to make demonstrations of the power of steam in the air which have been uniformly doubted by those who have read of them or heard about them, but when actually seen and the air breathed by the doubters their doubts have left them.

But to close up what I have to say about carbon dioxide at this time, I will merely state that when that gas is cold it is slightly heavier than air of the same temperature, but when carbon dioxide is expelled from the lungs it does not fall. There is but four per cent of the gas in the expelled air. Such gas and air are much warmer than the room in which we live, except in very warm weather, so that the gas and the air expelled with it rise to the ceiling of the room and remain there a long time unless removed by mechanical means, for it takes a long time for carbon dioxide to cool down sufficiently when hanging in the warmest part of the room to cause it to drop through the cooler air down to the floor. True, some of it drops down to the breathing zone and is rebreathed by whatever person finds it and is sent back to the ceiling for another long sail among noxious and ill-smelling gases, the excrement thrown out by the lungs and skin.

The place to take carbon dioxide out of a room is at the top of the room and not at the bottom, as has been supposed by many men of scientific attainment in the past quarter of a century.

The fallacy regarding oxygen and nitrogen is that they are breathed, the one to our good and the other without any purpose at all. It will take some space to show that we breathe these gases into our lungs for a higher purpose than to support combustion. The truth is of recent discovery and is not found in many text-books, if, indeed, in any at all may be found an exactly correct statement. I have yet to see the first one containing the important truths which the discoveries of Mme. Curie have brought to light and which Professors Eve and Rutherford of McGill University have studied with such brilliant success.

A single atom of radium will disintegrate and throw off particles of infinitesimal smallness for 20,000 years, and there will still be some of that atom left. This will be racy reading for those who have studied chemistry from the old books and believe that the atom is the smallest division of which matter is capable. Such is not the case. We know that atoms break up, and that the disintegrations of atoms produce far greater velocities and powers than the most powerful breaking up of molecules or chemical changes. Millions of times more powerful are the results of the disintegrations of atoms of certain elements than anything we have hitherto known.

Out of the ground are coming continually a stream of radio-active emanations, some of which fly at the rate of 10,000 miles a second and pass right through almost everything they come to. As these minute particles, so small that atoms are mountains in comparison with them, meet an atom of gas, or liquid, or solid, they go right through without any turning aside or bounding away. How a radium particle can pass through an atom of hydrogen or oxygen is not fully understood, only it is known now that it does that thing and that it imparts a peculiar form of activity or energy to that atom of gas. It ionizes it.

The word ion was invented by Faraday a century ago, for he knew of these enormous activities, but not to the extent they are known since Mme. Curie's great gift to the world of science. He named them from the Greek verb meaning "to get there," and called the ions which go up the electric current anions, and those going down, cations. He found ions only in connection with electric energy, but now we know there are vastly more ions produced by radioactivity than by electricity in the world. Professor Eve has measured the number of ions in a cubic centimeter of natural air.

The most important fact in our life is that we are able to annex to our bodies the power of these flying ions of of gas. Oxygen and nitrogen are taken into the lungs, not to have the oxygen partly burned up, but to be brought where the blood may come near them and be shot through with the radioactive energy which natural air carries.

We do not live on our food. We simply use the food to let it travel along in the blood to where it may be ionized or energized in the lungs by coming close to the natural air of outdoor. The lungs telegraph to the stomach when they are well supplied with energized air. The message is to send along more of that material, no matter what it is particularly,—"Only send us a lot of it for we have the air-bearing energy to load upon it." But when the lungs are supplied with air not carrying radioactivity they send word to the stomach to stop sending matter up there as it is of no avail for the time being, as the air coming in has nothing to impart to the food.

Now it is by radioactivity that we have any physical or mental strength. When we breathe right air and exercise so the lungs have a good current of blood passing through them to be ionized, we are coupled up with the greatest source of power in the universe and are gathering the strength which nature has decreed should be ours. But when we shut ourselves up in air that has been breathed over, or air that has simply been warmed, we are robbing ourselves of the power that nature has provided for us, but which we have declined to accept.

The air we breathe should be open air if possible. It should be as nearly natural air as possible, not only in radioactivity, but also in temperature, steam content, and all other qualities.

An enormous saving has been demonstrated under my own eye in the warming and ventilating of a large Chicago school-building. I have restored to the air the natural amount of steam which belongs to heated air and by that means made the rooms comfortable to children and teachers at 10 deg. less heat than is common. I am writing these lines in the office of the school where the temperature stands at 59 dg. F., and the air is such that I have not thought of temperature this morning until just now I arose to see what it is to record it here.

Do not mistake me as advocating chilling a room down and asking the occupants to get used to being cold or chilly. That is extremely dangerous. Air containing a steam-vacuum such as is commonly produced by warming cannot be made comfortable to the average person at 65 deg. and the weak person must have it at 70 deg. or more. It is dangerous to experiment with the lives of persons on the theory that they ought to live in cooler air. But by restoring the humidity-balance in air that has been warmed I have overcome part of the evil of heating the air we have to breathe, and have made a saving of 20 per cent of the fuel-consumption in a large guilding.

Our nation is suffering loss of vitality in the people generally in our northern states because we house ourselves in air that has a steam-vacuum in it. This air attacks the mucous lining of the breathing tract and produces all the foul-air diseases, besides materially increas-

ing the ravages of consumption. I have proved this in the bodies of hundreds of children who are living under conditions where this attack of dry air is not made on their breathing tracts during school hours. Diseases have very little hold upon these children and their teachers. If their home conditions could be correspondingly improved I am confident they would become almost immune to disease.

Resistance in the body, or bodily vigor, or what the physicians call anti-bodies, in our system is the greatest factor in growth, health, vigor, cheerfulness, morality, and intellectual power. Strange that these have been so universally overlooked in the past! But they are coming to the fore now, for the results are so patent that he who runs may read. Look at the children under my charge. Nearly 1,400 children with brighter eyes and redder cheeks than can be found in any other congested city-district north of Mason and Dixon's line!

I can show equally fine results in business-buildings where I have had the good fortune to introduce systems of right air. The air of the ordinary business-building is simply vile. It is deadly. The boss may be able to prolong his life by getting out into the open for his golf, his motoring, and his other sports. He may sleep with windows open and prolong his own life. But the poor employee has to fight for his life with his vitality run down to half what it should be simply because he is shut in from the radioactivity which would energize him and give him vigor.

G. F. Swift once said to me, "We find in our office that we can't afford to pay for the mistakes made by our men when they are working in a temperature above 68 deg." No business can afford it if the great packing enterprise then going on in the biggest business-office in the world could not afford it. No business can afford to run with a force of employees only 40 or 50 per cent efficient. If you are half-dead you cannot do even half a day's work in a day. The great problem in business just now is to get right air to the persons doing the business, to keep them fully alive, as cheerful as they ought to be, and as capable as their powers will permit. We must get away from the universal practice of doping our employes and trying to club them into efficiency. Some of the more intelligent managers of business-houses are already correcting their air-supply and not only saving the lives of their employees, promoting their efficiency, and making life worth living, but they are making money by the change that is coming into their affairs by reason of connecting their help up with the great source of energy which God intended the world to enjoy fully and freely. They are also saving fuel.

Heating the air damages it. In the first place air that is to be breathed or to be permitted to come into contact with the skin of man is devitalized by heat. The warmer you make it the worse it is.

Here is something the unscientific mind can readily understand. When air is natural and cold it contains some ozone. Ozone is oxygen gathered into molecules of three atoms of oxygen instead of two as warm oxygen usually stands. Ozone is made in the air by radioactivity or by electric discharge. Ozone is energized oxygen and a great help to the lungs in their work. And yet, air containing a good supply of ozone loses all of it instantly if it is warmed to the temperature common to an office or school room. Heating the air kills it. This is plain; it devitalizes it; it destroys its principal life-giving tendency. O_3 is instantly changed to O_2 and O_3 is needed for health and vigor.

Heating the air destroys the humidity. Not that the steam is destroyed by heat, but it takes more steam to satisfy warm space than cold. Steam goes the contrary way from other gases when heated and contracts enormously. It takes 22 times as much steam to make air right at 70 deg. as at 0 deg.

I see I have run beyond the limits set for me, and so will conclude this cursory view of a great subject, the greatest subject in hygiene, in education, in civics, in medicine, in political economy, in religion, in psychology, by simply stating the main propositions again.

The air we breathe is more valuable to us for its vitality than for the oxygen it contains. Carbon dioxide is not a deadly poison, but is entirely harmless if not taken in great quantities. The danger in foul air is in its toxins of fatigue and other excrementitious matter thrown off by the lungs and skin. Right air is comfortable at 10 deg. less heat than dry air. The air we breathe ought to be as cold as we can possibly get it, and it should be entirely untouched by the arts of man, or as nearly so as our circumstances and inventive genius can procure it.

WANT VENTILATION FOR SCHENECTADY SCHOOL.

A matter that is causing considerable trouble to the school authorities in Schenectady, N. Y., is that of ventilating the Union-street school. There are several hundred growing children in this building, which is one of the oldest school buildings in the city, and the ventilating system is of an obsolete type and is entirely incapable of supplying fresh and pure air in the class rooms. In its annual budget the board of education will ask an appropriation of from $10,000 to 15,000 to install a modern system for ventilating this school. Dr. A. R. Brubacher says that it is very unhealthy and against all the rules of hygiene to have the pupils and teachers cooped up in such unsanitary rooms, and that he will do his utmost to secure an appropriation for the new system. As things are now, practically the only fresh air that is circulated in the rooms must come from open windows, which cause draughts and subject pupils and teachers to severe colds.

NEWS FROM MINNESOTA.

F. J. Spriggs, 43 West Fourth Street, St. Paul, Minn., is making good progress in the plumbing and heating business. He has been doing all the Missouri Pacific R. R. work in Minneapolis, North Dakota, Washington and Montana, amounting to $250,000. In Brainard, Minn., he installed the plumbing and heating plants in the M. P. R. R station and shops, for which he secured $20,000; in Staples, Minn., he did the heating and plumbing in the depot, $5,000; in Laurel, Mont., heating and plumbing the railway shop, $25,000; in Dickinson, N. D., heating and plumbing the depot, $3,000; in Paradice, Mont., heating and plumbing the railway shops, $30,000; in Billings, Mont., a $7,000 job; in Pasco, Wash., he installed plumbing and heating in Y. M. C. A. Building amounting to $8,000; M. P. R. R. depot at Ritzville, Wash., $3,000. Mr. Spriggs has just received the contract for the installation of the plumbing and heating systems in the state college of Minnesota, amounting to $40,000, also for the state institutions in St. Cloud, Minn., amounting to $20,000.

Nelson & Metzler, 321 Bush St., Red Wing, Minn., have several big contracts on hand, one to install a steam-heating system in the Vollner Hotel amounting to $1,200; another, to do the heating in the new Workman building, amounting to $1,100; they also have secured the contract to install heating and plumbing plants in the St. James Hotel in Red Wing.

Beier Bros., 425 Sibley Ave., St. Paul, Minn., who conduct an up-to-date plumbing establishment, think that "Domestic Engineering's" editorials on "Guarantee" and on "Sub-Contracting" the finest they have ever read and worth a lot to all the plumbers in the country. Mr. Beier says they are the best every printed.

Contracts are now being let by the city of Eugene, Ore., for the installation of a filter plant.

WHAT IS HARD SOLDER?

Editor "Domestic Engineering":—Will you please explain what hard solder is? A certain U. S. inspector ordered me to use hard solder in a certain job, and now I cannot find anyone here who knows what hard solder is.

Rawlins, Wyo. A. M. L.

The term "hard solder" is used to distinguish it from the soft solder used in our craft. The term applies to a kind of composition that will not flow under a red heat. The hard solders are known as German silver, gold, silver, copper, etc.

A solder that is sometimes used on iron is made of copper 60 parts and zinc 40 parts. Another, which is said to be very ductile and that will not break when hammered, is made of three parts silver and one part copper.

Take this for a tip: When using the solders in which brass is used see to it that none of the metals used contain iron.

HAS A LEAKY STEAM COIL.

Editor "Domestic Engineering":—I have a small coil in a customer's home that leaks sometimes. It is made of pipes and two manifolds. The pipes seem to spring a little and this is followed by a leak. Perhaps you can tell me what the matter is and how to remedy the defect.

"Coils."

A steam coil in a residence is a most unlovely ornament and generally a source of constant annoyance for one reason or another. We should recommend its removal and in its place install some good type of wall radiator, which will make a better looking job, and the chances are that it will give better satisfaction. The coil, as you seem to have installed it, has no chance for expansion equally, and therefore the leaks.

If the owner will not stand for a wall radiator you can use a miter coil or make use of a continuous coil but neither will be as satisfactory as the radiator mentioned and to our way of thinking the cost will not vary so very much anyway.

HEIGHT OF RADIATORS FOR HEATING EFFECT.

Editor "Domestic Engineering":—Supposing that you were going after a house to get the best heating effect and that you could use radiators regardless of their height, being restricted as to the extent that they came out into the room to two-columns width. What height would you choose? Is there any difference in the effect between a low radiator and a high one?

J. L. H.

As compared between surfaces of the same extent and in still air, it has been found that radiators of the low type give better results than the tall ones. By that we mean that a 40-foot twenty-inch radiator would be more effective than a 40-foot radiator forty-five inches high. We believe that in a case similar to the one stated, we would be governed somewhat by the height of the rooms and endeavor to make the radiator heights harmonize in effect and, in general, we assume that it would be found in the 38-in. height. Of course there are exceptions to this, but we are speaking now of the ordinary run of houses as found throughout the country.

THE PUSH-NIPPLE OR THE SCREW-NIPPLE JOINT?

We have had several questions come to the office lately regarding the merits of the push-nipple and the screw-nipple joints. They are used both on radiators and boilers, as you well know, and while we know the arguments that are generally used regarding these joints, we should like to ask some of our readers to give us the benefit of their various experiences by sending us a letter of from 200 to 400 words relating to this subject. We will put it in the form of a few questions, if you prefer, and then you will know just what you have to draw to. Come across to the following:

1. Applied to radiators, which style is the easier to repair?
2. Applied to radiators, which stands up better under the usual tests?
3. Applied to radiators, which style lasts longer without repairs?
4. Applied to boilers, which style is easier to put together?
5. Applied to boilers, which style has the least number of leaks?
6. Applied to boilers, which style lasts longer without any repairing?

In answering these questions you will please confine yourselves strictly to the matter at hand and not dwell on any particular make of boiler or radiator. We are after the mechanical points of the question, only, as information of interest and benefit to the craft.

FLANGES NOT SCREWED ON.

Editor "Domestic Engineering":—Are flanges ever put on to steam pipe and not done so by having threads on the pipe and riveted instead of following the usual manner of it is done?

S. L. G.

There is a kind of flange used on large pipe known as the shrink flange. This flange is shrunk on to the end of the pipe and riveted instead of following the usual manner of screwing the flange on the pipe.

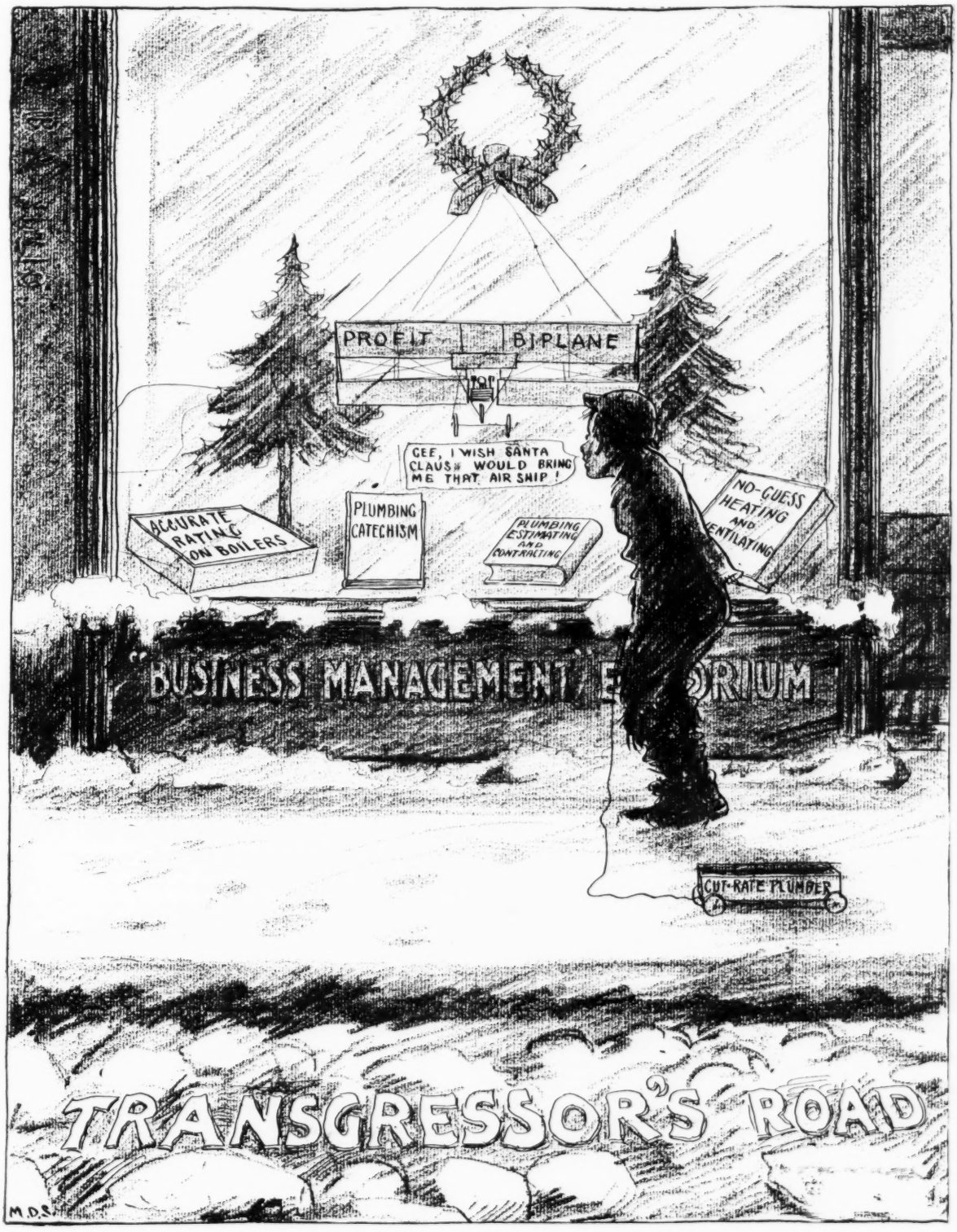
PURPOSE OF THE AIR-CHAMBER.

Editor "Domestic Engineering":—What is the air-chamber used for on a force-pump? Would the pump not work as well without it?

L. D.

The purpose of the air-chamber is to prevent water hammer and to assist it equalizing the stroke of the pump. You will understand that water can be compressed but a trifle and that when the pump is working it starts and stops a column of water. If there is no cushion (so to speak) anywhere to receive this shock, there will be a clear case of hammer. This same case of hammer also applies to a plumbing system, and for that reason, in the ordinary installation, the air-chambers are used on the pipes.

"Domestic Engineering" Cartoon on "The Wistful Under-Estimator."—XVI.



He Wants the Only Biplane that Does Not Turn Turtle.

If you want to possess a special proof of this or any other of our cartoons, let us have your request at once. We have many applications for our cartoons for framing and want to take good care of all demands made.

REASONS WHY MASTER PLUMBERS SHOULD BELONG TO MASTER PLUMBERS' ASSOCIATIONS.

This is the "round-up" season with the Pittsburgh Master Plumbers' Association, and Secretary E. M. Tate has thrown out the life-line to those who are in danger of sinking beneath the waves of the outside world.

There have been other "round-ups" by the Master Plumbers' Association in this district this year, but the one now "on" will be the real big one.

So great is the interest in the parent association, that the members in the East End district are laying plans to form an auxiliary which will work in conjunction with the main organization. No one can become a member of the East End organization who is not identified with the Pittsburgh Master Plumbers' Association.

Here is the argument, in letter form, which the Pittsburgh Association is pushing at the non-members, and it has already started to produce results.

Initiation fee in the Pittsburgh Association has been reduced to $15 until January 1.

The following is a letter written to a master plumber non-member, who said that $16.00 a year was better in his pocket, than in the treasury of the Master Plumbers' Association.

"After our 'phone conversation, I thought that before I call on you again, it would be well to give you some reasons in a letter, why you should be a member of the Master Plumbers' Association.

"You may be able to get along in the same way without being a member, and thus think you are saving $16.00 per year, but there is no doubt but that you are benefited by the association, through the members who pay for the protection it affords.

"It is impossible to reckon all the advantages in dollars and cents, but we might note some of the disadvantages there would be, if there was no association. Let us take up trade-protection. This is indeed the vital subject and means more, probably, than anything else in connection with the business.

Yours is a building trade, the same as the carpenter's, plasterer's, or bricklayer's, and you know that you can buy any of the materials of the above mentioned and any other building trades just the same, and for the same price as those in the business can do. How many buildings have been and are being erected, where the carpenter contractor is superintending the work and furnishing the labor at cost, and the owner is furnishing the material, all except the plumbing.

"He has found it necessary in all cases to get a man regularly engaged in the business to do his work, simply because he cannot purchase the goods on account of trade-protection, which is in effect because of the Master Plumbers' Association. Even now strenuous efforts are being made to overthrow this protection, and it is through organization only, that such efforts can be curtailed.

"Then again the plumbing business is different from any other building trade, as there is much jobbing work, and still you do not find your customer buying the bath-tub, closet, lavatory, etc., elsewhere, and asking you to install same. Why? On account of trade protection, made possible through the Master Plumbers' Association, and yet, you say that you see no good in being a member.

"Is it because you feel that the association is of no benefit to you, or is it that you know it is a good thing, but are willing to enjoy the benefits paid for by others, while you keep on the outside.

"Another argument: The Master Plumbers' Association has an agreement with the Journeyman Plumbers' Union, which we believe is fair and just, and by this agreement, we know what condition can be expected along the line of labor, the rate of wages, etc. If there were no agreement, the master plumber who is doing a great deal of work, would find that some unscrupulous journeymen would make unjust demands on their employer, so that to get men to work for him, it would be necessary to pay a premium of 50 cents a day, and sometimes more, in order to get his work done.

"This condition does not exist in Pittsburg and you know why. It is because of the fact that the master plumbers are organized and have a satisfactory agreement. Were there no organization, the master plumbers would be helpless and all would be clamouring for an association. Now since we have an organization, you can stay on the outside, save your dues and be a deadhead if you like, and still reap a portion, but not all of the benefits paid for by others.

"Then we have the city departments, such as the sewer department, the water department, the street department and the plumbing-inspection department, with whom satisfactory arrangements have been made in regard to filing plans, bonding master plumbers, etc.

"Then again, attendance at the meetings where one can often learn of improved methods of doing business or better ways of doing work, which is a factor that is appreciated by every one who goes to the meetings and comes in contact with a brother master plumber in a friendly manner.

"Just think, $16.00 a year for all this, how much would you be willing to pay if there were no association? What position would you be in if the association would suddenly cease to exist?

"Who wants to be a member of the Master Plumbers' Association? Is it the jobber, the manufacturer or the public? No, it is the members of the Master Plumbers' Association, who are united for protection in business, they protect you and think that you should help to protect yourself. They are your friends, and I trust that you will recognize this fact, since it has been called to your attention so plainly.

"Kindly give this matter your careful consideration, and if there is any other information I can impart, I will be very glad to see you in person at any time you may suggest."

PROVIDENCE PLUMBERS HONOR FREDERICK C. LEES.

The members of the Master Plumbers' Association of Providence, R. I., paid a visit to the new home of their former president, Frederick C. Lees, at North Providence, a few nights ago and held an old-fashioned house-warming party. Mr. Lees was presented with a large mahogany hall-clock, the presentation being made by Thomas E. Manney. Among the master plumbers who participated in the good time were President C. P. Brennan, of the association; Vice-President John F. Davey, Secretary James Phillips, Treasurer Thomas Tierney, Joseph Appleton, James Catrell, William M. Keller, H. H. Dughphinee, Edward Barry, William M. Congdon, Thomas E. Manney, John C. Dunn, Henry L. Graham, M. F. Murphy, Edgar C. Hurdis, Terrence Oakes, L. L. Gentner and William Brennan. Several took part in the musical program which was provided.

The Vicious Quantitative Standard in Ventilation

By William Henry Lynch.

William Henry Lynch, Consulting Engineer on Ventilation, is an expert on both building and car ventilation. He is an Associate member of the Association of Railway Electrical Engineers, and is one of a Committee on Ventilation which will report at the annual meeting in Washington, D. C., next year. Mr. Lynch as an inventor is an expert in both the principles of ventilation and the mechanical practice. His article is the pivot of the discussion between the old and the new school.

There is a method of ventilation that has come into general vogue in recent years, and in certain circles is looked upon as the only scientific system, or the last word on the subject. It is called the "plenum" or pressure system. In practical working, it means the forcing of air into a building, conducting it by ducts into the various rooms, and again conducting out what is supposed to be the vitiated air. At what point the inlet and the outlet shall be placed is not an essential part of this system. The present practice seems to favor the entrance of the air at the top and its exit at the floor, and to locate both at the same end or side of the room.

But there are certain other features that do seem to be essentially a part of the system.

First, the **quantity of air demanded.** In practice this system requires **1,800 cubic feet per person, per hour,** as a minimum quantity, and some authorities are not satisfied with less than double that amount.

Second, since it would not be desirable to have so large a quantity of outside cold air flowing in through the rooms, it becomes necessary that the air be heated **before it is introduced into the rooms.**

Another essential requirement is that the **windows be kept closed,** so that the air shall flow out only by the channel provided for its exit, or that it may not be diverted from its prescribed channels.

It is not the first purpose of this article to discuss exhaustively the merits or the defects of the plenum system itself. The latter is treated of here (in a secondary way) because of its essential relation to the main subject—the present so-called standard applied to determine effective ventilation. By this standard, as a matter of fact, **a single factor** is made the test of effectiveness, and that factor is the **quantity** of air-supply.

Let us consider the reasonableness of such a standard, and its effect upon ventilation. First of all, let us consider the reasonableness of **any standardization at all** as to ventilation, at this stage of development. What is the object of standardization? Its purpose may be defined to enforce a high degree of merit or efficiency. In practice, it means to fix upon a model or pattern and then to exact general conformity thereto. A pattern or model involves completeness, finish, a reasonable approach to perfection.

When shall a thing be standardized? To standardize anything and to make it a pattern to which there will be enforced conformity, is to put a check more or less absolute upon development. A standard is not a changeable thing but something fixed, settled, regular, constant. By this we see that standardization may be premature, and if premature is an evil; it is illogical and irrational beyond question.

To stop the development of something so incomplete and imperfect and to crystalize it into a finality, to make it a pattern that right or wrong must be strictly adhered to, and thus to check all progress towards maturity, would not make for efficiency either present or future. **This would be more nearly to fossilize than to standardize.**

This is fundamentally so important and so ill understood that I have had to emphasize it, but it really is so simple and clear—so near the surface—that the wonder is that it had to be even stated! In other fields, the principle is understood as a matter of course. No inventor, for instance, is supposed to be so wanting in ordinary common sense as to take out a final patent while his invention is in the formative stage. If he needs protection meanwhile, he takes out a caveat.

William Henry Lynch.

Has ventilation reached a stage of completeness that would call for or justify any standardization at all? **If there is anything that is in the caveat stage, and not very far along at that, it is this very matter of ventilation.** Although in its vital importance second to almost nothing else in hygiene and sanitation, it is a subject that has been notoriously neglected—upon which there is an ignorance that is almost colossal, even in circles where a theoretic, technical and practical knowledge would seem to be imperative. Although this statement is somewhat dogmatic in form, I am confident that no one will have the temerity to challenge its reasonableness.

While agreement is not evidence of knowledge, knowledge involves agreement, for truth is not contradictory to itself. If there is any other subject of large and vital importance upon which there is so specific and complete disagreement as there is in regard to ventilation, it does not occur to my mind. It will take but a superficial enquiry with this phase of the subject to find that there is almost no consensus of view, either as to the funda-

mental principles of ventilation or as to the practice. There are at least two schools of thought as to the principles, and the divergence of view is very great.

One school contends that **quantity** of air is the first essential, and one might believe almost the only essential to be emphasized. It certainly is the **only factor that has been "standardized"!** This school has gone so far as to finalize and entrench by municipal ordinance and state law this partial, exclusive and wholly premature standardization!

With this school, **quality** of air and **distribution,** in both theory and practice, are practically considered wholly secondary in importance and it would seem almost negligible quantities.

The other school insists that **quality** of air is a prime essential and of the very highest importance, and that **distribution** is only second in importance. The question of quantity in its judgment is comparatively a very secondary matter, and quantity is recognized as a factor too variable and inconstant to be fixed upon for standardization and consequent wide application.

I contend that even if the divergences of view already shown were the only points of disagreement they should be enough to forbid any attempt at all at standardization. The disagreement is too marked and wide to be ignored and the matter too vital to be settled in a one-sided way. It would seem that the merest shred of common sense would demand that before standardization should be even remotely suggested there should be some reasonable agreement in this matter.

The two schools are too far apart to allow that both are right. It may be both are wrong. Who knows? Who is to determine At least no one faction has any right to put the other faction out of court. There is absolutely but one rational ground upon which it may be reasonably assumed that the truth has been arrived at—it must be a case of general agreement. Make it unanimous, or drop it.

It is not essential to my argument therefore to determine which school is right, or whether either is right. The one thing only to be considered is the essential fact of so wide a disagreement. I claim that even if the disagreement noted were the only debatable ground it would be enough to forbid any thought of standardization while the matter remains unsettled.

But it does not cover all the debatable ground. We have hardly begun to show the points of disagreement. It is indeed not so much a question of what are the points of difference, but what points there are in which there is an agreement! Let us note some only of these many points of difference.

1. There is a difference of opinion, not only as to whether the time for standardization has yet arrived—as already discussed, but **whether any standardization at all,** in connection with ventilation, now or later, will ever be practicable and effective. For quality—the most important factor of all—Nature herself has fixed the standard. Quality is a constant, not a variable quantity. To make it an imperative standard today would **rule out completely the ventilation system most in vogue,** the only system to which the existing quantitative standard has any logical application, and the one in whose favor that standard unduly discriminates—the plenum system! If that action were attempted by those who do not favor the present standardization, the fight that would be on immediately would be such that abundant evidence of disagreement would be discernible without a microscope.

As to **distribution,** that is something so variable in its application to the thousand and one conditions that it is inconceivable that any normal intelligence would attempt to make standards thereof to meet all cases.

As to **quantity,** if the present standard were dismissed, there would be no call by the other school to have another standard enacted. With air of the **quality** standard provided by nature, with the attention given to **distribution** that its importance deserves, **quantity would take care of itself,** for it would be necessary only to follow the simple rule **to make the quantity of air as large in all cases as the conditions will allow.** To fix by standard what that quantity will be, and make it applicable to the thousand and one cases, is impracticable; and standardization gives way in this case to a simple common-sense rule, easily applied. By such a rule, we may hope at last to approximate to what is true ventilation, or a condition induced as to air indoors as nearly as possible like in the open air. I believe that if one will correctly analyze the essential conditions of successful ventilation, he will come to the conclusion that to build up any sort of standard that will be effective and satisfactory is practicably an impossibility. Personally, I would prefer trying to ladle out a big lake with a teaspoon, for in the latter case there would be this advantage that every spoonful taken out would be so much progress **in the right direction.** In the other case, there is always the danger of doing—what I believe is being done now by the existing quantitative standard—more harm than good.

2. It is claimed by one school that heating air destroys its humidity, and that to rehumidify it is a problem—one that at the best has been solved only partially and in a very restricted degree. Also that great evil has been the result of this form of air-vitiation.

Without going into the matter exhaustively, let me give some only of the evils actually charged against the dehumidified heated air that **is provided by the ventilating system which is the only one that demands the present legal standard** now under discussion.

In the city where I am writing, the citizens are paying for the ventilation system under discussion probably an average of $9,000 for each building. They are paying the added cost of keeping up the system or for heating and forcing through the rooms for ventilation purposes a hundred times more air than would be required merely for heating needs alone. My first statement is that **all this expenditure is lost**—that there is absolutely no value in it! There are schools in the city for which no expenditure at all has been made that give **better ventilation than is provided in the ones referred to.** There are other schools, not far from this city where at a very much smaller cost, both for installation and working, the satisfaction given is such that the investment is rightly considered a good one.

To say that this first-mentioned expenditure is a total loss, is only in part to express the financial loss. By the use of that system the **percentage** of efficiency of the schools is seriously **lowered,** probably from 25 per cent to 50 per cent and **it may be much more.** Do you realize what this means It means that every dollar invested in school-buildings and school-property is discounted in actual value to the per cent that the efficiency is short! It means a similar discount as to returns for **every dollar expended annually in keeping up the schools!**

If a business-concern were making such a showing as to its investment in plant and in the amount paid out yearly in the running of the business how long would it be likely to survive?

But if this financial loss were all, it would be compara-

tively nothing serious. The loss from misapplication or misuse in this city of a few thousands—or millions, for that matter—is a matter of little public concern and would not be likely to create a ripple of excitement upon the surface of its gay life. Whose business is it to care? But there is a further loss in the case of the city schools that is more serious—a loss that is of concern to the most humble citizen who is a parent or whose heart goes out to children and who would gladly protect their interests and rights. You will think incredible what I am going to tell you, but what I am here giving you is on better authority than that of the writer would be.

According to this authority—and he is not unsupported—the **bad air in these expensively ventilated schools** defeats largely the **very purpose of the schools!** It makes it difficult to teach many if not all branches—language, grammar, spelling, history, etc. It makes children stupid.

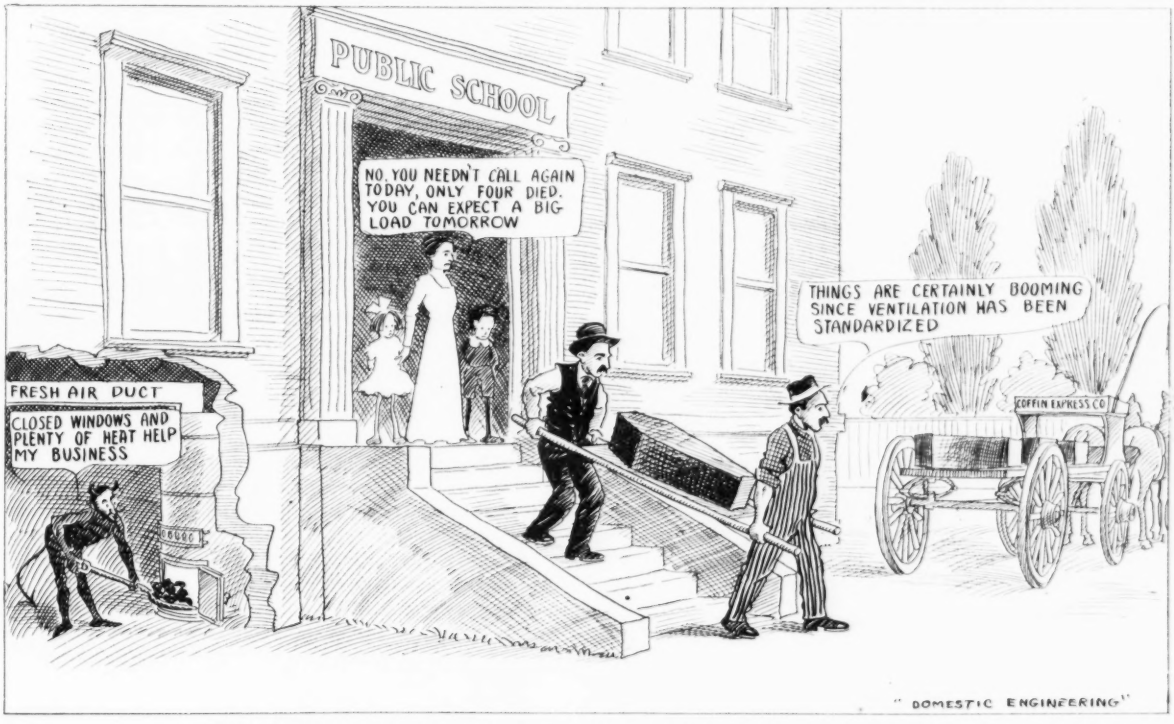
It gives children headaches. And it does to them the worst possible thing that could happen to them from the standpoint of health—it **lowers the vitality or power of resistance,** upon which the human being must depend to ward off diseases that are everywhere imminent. It destroys the only immunity from disease that a human being can safely depend upon.

If that be true, you are prepared to learn that the displacement of pure air by artificially depleted air is responsible for such diseases as tuberculosis, pneumonia, grip, catarrh, and directly or indirectly for many others. Is that all? I do not know what more you would expect, but our authority goes even further. He tells us that it makes criminals and is the cause of debility, poverty and insanity.

And this city is not the only place where this deplorable thing is true. This system is in its bad working order throughout the whole country.

Here, by the way, is a form of "race suicide" that deserves all the attention the citizen can give it. It would require an article by itself to give the available quotations in support of the claims above made, but the following tale out of school ought to give somebody a jolt:

"The defeat of the school by the atmosphere of the school is so common that we have ceased to marvel at it! The fatigue of pupils is such that what they have learned with great pains and much review **does not remain long with them.**—Now that we know what causes the trouble and why education **is almost physically impossible under conditions of temperature and humidity common to ordinary systems of heating** and **ventilating,** it is our duty to take stock of the trouble we have on hand and get rid of it as rapidly as possible—**We are selling too many short coffins in America."**


PUBLIC SCHOOL
NO, YOU NEEDN'T CALL AGAIN TODAY, ONLY FOUR DIED. YOU CAN EXPECT A BIG LOAD TOMORROW
FRESH AIR DUCT
CLOSED WINDOWS AND PLENTY OF HEAT HELP MY BUSINESS
THINGS ARE CERTAINLY BOOMING SINCE VENTILATION HAS BEEN STANDARDIZED
COFFIN EXPRESS CO
"DOMESTIC ENGINEERING"

The "Fresh-Air" School Says the Devil is Interested in Ventilation as Now Practiced.

3. That air for ventilation should **not be heated**—that to heat it before sending it into the rooms is to devitalize it. It is contended that by heating the air it has been depleted of certain qualities that are not restored and that by our present knowledge cannot be restored. It is not necessary here that I prove this to be true. All that is required of my argument is the fact that this view is taken and that it demonstrates a divergence of opinion that makes improper any standardization at all, particularly a **form of standardization that is charged with the responsibility of the harm that is being done!**

4. That the cost of installation of a heated-air system is relatively too great.

5. What the premature and unwarrantable standardization of air quantity has a logical application to only one particular form of ventilation, and that not only it has no application to other systems but that it has a tendency actually to check the development and introduction of other systems.

6. That when air is heated before being injected into buildings, the quantity to be thus heated is so much greater than is demanded by other methods of ventilation that it adds materially to the cost of ventilation.

7. That vitiated air is above the breathing zone, and that in most cases at least the outlet should be at the top.

8. That if it should happen that in the working of the plenum system it is better to put the outlet at the bottom, it is no reason why that plan of installation should be standardized and made obligatory upon other systems, the doing of which, by the way, would be only following the precedent set by the present standardization!

As a matter of fact, with the exception of the plenum system, the taking of air out from the top is almost universal. In cars, for instance, all air-exhausts are at the top. Imagine the effect of a standardization based upon the practice of the plenum system that would force the placing of air-exhausts in cars at the floor!

9. That windows are logical ventilators and that any system that forbids the fullest, freest use of them by the occupants of rooms—by those most concerned—is faulty.

10. That in regard to present standardization, the laws and ordinances can be fully complied with and yet without giving real ventilation either as to quality, or distribution, or even as to the necessary quantity itself!

On all of the above points there is essential divergence of view.

When we remember that ventilation is both a science and an art—that it involves fundamental principles and a mechanical application of these principles, also that ventilation is intimately associated with a wholly distinct thing—heating—we see that it becomes a complex subject. The almost endless conditions to be met add further to the complexity. To standardize such a situation, in the face of absolute complete disagreement in principle and practice is like an attempt to standardize chaos itself. From a rational standpoint, it is unthinkable.

Another objection to this quantitative standard is the narrowness of its application. A standard for ventilation is intended to be and as a matter of fact is used as a general test of any system that may be proposed. For that reason it should have a universal application. It should cover all conditions and all methods. No standard is practicable in ventilation that will do this or begin to do it. How far short the existing standard falls is so much in daily evidence that there is little excuse for not seeing it.

The requirement has a two-fold application; it demands a certain quantity of air per person per hour—1,800 cubic feet; and a certain amount of space per person—600 cubic feet. Try to apply these requirements to different situations. In a school room the double application may be possible. In a bedroom the space requirement is possible, but quantity is not practicable for general enforcement. In a railroad car it is even less practicable. A car will seat, say, eighty persons. It will carry more. The space available per person is only 60 cubic feet per person, or only **ten per cent** of the standard demanded. Should the standard be insisted upon here, an 80-seated car would be allowed as to space to carry only eight persons and as to air quantity to carry anywhere from eight to eighty persons; according to our ability to change the air three times per hour for eighty persons, or thirty times per hour for eight persons.

If we apply this standard to the berth of a sleeping car, we multiply many fold the absurdity of the requirement. Consider the greater absurdity of the exaction as to a sleeping bag, in which as a matter of fact good ventilation is realized with the head covered, out of doors where the temperature is low. If in a sleeping bag in a car berth, and in the car itself good ventilation may be secured without recourse to the standard, why assume that the application of the standard is necessary to secure it under the more favorable conditions of larger space?

I find that the limitations of space forbid going over the whole ground of the agreement at this time. More than enough has been given already, however, to justify the use of the word vicious as applied to this particular standard, if not to all other that may be proposed. Perhaps its worst feature of the present standard is that it discriminates in favor of only one system and a system that is in bad repute. If universally enforced, it would shut out all systems except this one that is already in disfavor, and there are situations where, because of the impossibility of its application, it would shut out even this very system itself.

Its vicious character is seen best in actual working. It is a fact that in the city where I am writing there has been for years a call for something in the way of ventilation to take the place of this recognized failure—the plenum system. This protest has been megaphoned from the house tops. And all this time the door has been closed to anything offered in the way of ventilating systems that have not the hallmark of this impossible standard! In authoritative circles the king dies and lives again, and nothing doing. Trustees are off again, on again, gone again, Gallagher, and—nothing doing. The hot regions of the public schools are making tuberculosis patients faster than they can be cured by the out-door cold-air treatment, and—nothing doing. This is due not to the lack of anything better being available. It is due rather to the inherent persistency of this standardized atrocity, and the closed door is a logical sequence.

One vicious feature is the fact that it doesn't die easily when its time is up. Even those who see its faults are inclined to prolong its life rather than simply putting an end to it. It is proposed, for instance, to reinforce it by **standardizing some more!** That is going some. And so is tobogganing; but tobogganing is not progress. If we must standardize something, let it be the season for the straw hat, or the traditional piece of chalk, but as to this ill-conceived standard for preventing ventilation, give it anything rather than a new lease. One authority whose great abilities have brought deserved high recognition, proposes to ameliorate an admittedly bad condition by standardizing eight more factors. That is like raising to the eighth degree the accentuation of the inefficient.

But, I will be asked, can we secure ventilation without a standard? The answer is that it is the only way in which it can be secured. And this reminds me. The old darky seemed very happy after his wife's funeral, and when he was asked if he and his wife had not been getting along well together, answered that they "didn't get along so well together as they did apart." Ventilation and standardization will get along better apart than together. That they are not getting on well together now—after these years of opportunity for mutual adjustment—is a fact of which the evidence is overwhelming.

From a recent address Dr. Edward Clark, of Buffalo, is quoted as follows:

"The subject of proper ventilation of school buildings is still an unsettled problem and its proper solution will depend to a great extent upon expert engineering skill."

Mrs. Ella Flagg Young, superintendent of Chicago schools, in her latest report made a statement of like import.

By their fruits ye shall know them. The question that presses for consideration is whether this discredited factor shall be prolonged, or whether it be discontinued.

If there is to be more legislation in connection with this subject, the following is suggested as a substitute motion:

That no system of ventilation be allowed which forbids the free opening of windows at the pleasure of those most concerned.

That for devitalized air we substitute air de-standardized.

The space editor just handed the writer a punctuation mark and said it was the last one he had. This brings me to a full stop and the argument far from exhausted.

If more is needed, therefore, we can come back. Meantime the case may well be rested upon the fact that there is almost nothing in ventilation that is settled. As to temperature, the discussion is hardly begun. Drafts? To thousands of people a draft is the skull and crossbones, while to others it is a mere bogey. As to outlets one would have them at the floor, another at the ceiling. Is it dust? One would try to fix by statute the amount allowable. Another would standardize, if anything, the allotted peck of dirt.

Carbon dioxide, once thought to be poison, is now believed to be not hurtful, and an indicator only of vitiation. Others now claim it is not even a true indicator and that air is bad because of what it lacks—because it is depleted.

And so it goes with all the other factors—volume, quality, distribution—no agreement anywhere.

There is but one conclusion: There is nothing in ventilation of which we yet have the last word, and to finalize anything about it now is to standardize not knowledge but ignorance, and an ignorance that is colossal.

PHILADELPHIA AND VICINITY.

The Abram Cox Stove Co., American and Dauphin streets, Philadelphia, has been taking on additional foundry hands.

The first account of the estate of William Sellers, former head of the William Sellers Co., manufacturers of tools, equipment, etc., who died in February, 1905, was filed by the executors December 8th. It shows that deceased left property valued at $5,622,238.18.

The Philadelphia Foundrymen's Association, with which a number of manufacturers of plumbing, steam-fitting and lighting materials are connected, held its 203d meeting December 7th, at the Manufacturers' Club. It was practically decided to accept the invitation of the New England Foundrymen's Association to attend their annual banquet at Boston, Jan. 11, 1911. The Philadelphians will go in a special chartered-car for their comfort and as a sign to the Boston "boys" that "we uns ain't asleep, you know."

The Sanitary Heating Co., 1420 Chestunt St., is successfully exploiting its "Solar Grand" gas-heating appliance, designed for homes.

Bang the iron while its red-hot! So thinks Thomas L. Makin, heating expert, of 2220 Bridge St. When Thomas awoke December 5th and saw three feet of snow he rushed into print: "Now is the time—prepare for winter; all methods of heating installed; let me estimate." It did it—landed good orders. Go to, thou, and do likewise.

Contracts for heating plant installations were made during the week ending December 10th as follows: F. E. Brown—on Germantown avenue for the Philadelphia Rapid Transit Co., cost, $300; G. P. Oberhaltzer—at 2517 North Ninth St.; Frank W. Taylor & Son, at 1125 to 1133 South St., cost $450.

Pavers and rammers, who are somewhat closely connected with plumbing operations, especially street sewer and house connections, have "demanded" $4 per day for eight hours' work. The present wages are $3.50 per day for pavers and $3 for rammers.

Joseph K. Cassel has the contract to install a heating plant at 540 High St., cost $125. Charles H. Gerlach will install a $175 heating plant at 2012 Dickinson St.

W. G. Moore, sanitary expert of Newport, R. I., who is supervising the new sewerage disposal plant at Haddonfield, N. J., is laid up with the grip.

Edward Tyson has opened a new plumbing and heating establishment in the Swartley Building, North Wales, Pa.

John Gribbel, who trades as John J. Griffin & Co., manufacturers of gas-meters, 1530 Race St.; John Kisterbock, of John Kisterbock & Son, 2002 Market St., and William E. Helme, of Helme & McIlhenny, manufacturers of water and gas-meters, 1339 Cherry St., have been nominated as candidates for directors of the Union League, Philadelphia's most exclusive social organization. The League has just moved into its new club house on South Fifteenth street, erected especially for its use at a cost of over $250,000.

PATERSON PLUMBERS PLAN THEATER PARTY.

The Master Plumbers' Association of Paterson, N. J., has decided to give a theater party to its members and their friends on Wednesday evening, Jan. 11, 1911, at the new Majestic theater in that city. Just where the banquet is to be held has not yet been decided upon.

The members have recently decided that in the future they will not include any sewer connections from the street to the curb line in contracts. Under the new ordinance adopted by the board of public works, the board has made a contract for this work with McKiernan & Bergen. The plumbers will have nothing further to do with the street openings while the ordinance is in effect and will notify all architects. Property owners in the future will have to go to the city hall and make their own arrangements for street openings.

SPECIAL ACCOMMODATIONS FROM CHICAGO TO MILWAUKEE FOR THE A. S. OF I. OF P. AND S. E.

Arrangements have been made with the Chicago, Milwaukee & St. Paul Railway for a special train for the exclusive accommodation of the members of the American Society of Inspectors of Plumbing and Sanitary Engineers to leave Chicago at 8 a. m., February 6th, arriving in Milwaukee at 10 a. m., in ample time for the opening of the sixth annual meeting of that society. This train will be made up of C. M. & St. P. sleeping cars, observation-library car and dining car in which breakfast will be served.

All members and guests contemplating attending the convention are requested to notify Secretary Thos. J. Claffy, 215 Madison St., Chicago, so that necessary accommodations can be provided. Should there be sufficient number to warrant it, arrangements will be made for special train to run as second section and carry same equipment as this train.

It is earnestly requested that the members arrange to go as above, thus affording an excellent opportunity to get acquainted and have an enjoyable time en route

PREPARE FOR THE NEXT ANNUAL CONVENTION OF THE NATIONAL ASSOCIATION OF MASTER PLUMBERS.

The Association of Master Plumbers in Galveston, Tex., is evolving plans for the two conventions it will have on its hands some time in June, 1911, when the Texas Association of Master Plumbers and the National Association of Master Plumbers will hold their annual meetings in that city.

For some time past, ever since it was announced that the Galveston plumbers has raised a fund of $2,000 as a nucleus for the entertainment of the national body, the master plumbers of the city have been holding meetings every Tuesday evening, during which plans have been evolved and ways and means discussed for the entertainment of the many visiting delegates and their ladies.

Architect Frank Glaichauff, of Columbus, O., has completed plans and specifications for a recreation building to be erected at the St. Vincent Orphan Asylum in East Columbus, O. The building will be of brick and two stories high. It will contain an auditorium, shower bath, swimming pool and play rooms.

SOLUTION OF THE PROBLEM OF SCHOOL-VENTILATION IN BENTON HARBOR, MICH.

Some time ago the writer was invited to investigate the school-system of ventilation in Benton Harbor, Mich. He was received most cordially by Wm. R. Wright, the able superintendent of the city's educational centers, at the Benton Harbor High School, where Mr. Wright makes his headquarters. The ventilating system there is of the simplest and yet most effective kind. Ventilation is provided by a special ventilating attachment to the lower sash of each window. This apparatus is not cumbersome, excludes dust, creates no drafts and yet ventilates freely. The degree of air-admission is also under simple and effective control. The device is the invention of William Henry Lynch, a Chicago ventilating engineer, who has devoted many years to the study of ventilation and its problems. Mr. Lynch, in consideration of his evident grasp of the subject, has been appointed on the Committee of Ventilation of the Association of Electric Railway Engineers.

The testimony of Superintendent Wright and his teaching staff was to the effect that the pupils were kept in perfect condition owing to the purity of the air-conditions and headaches, formerly common, are now unknown.

Edwin Lawrence Downs, of Chicago, is the architect of the school-buildings in Benton Harbor, Mich., in which was installed the Lynch system of ventilation, that has given so great satisfaction that it is attracting wide attention from school boards and educators who are looking for better results than have been realized from the more costly systems that have been adopted in late years. Mr. Downs, speaking of his connection with this notable achievement, says:

"At the time I drew the plans for the Benton Harbor High School, I was under the impression, shared in by other architects and engineers generally, that the best method of securing ventilation was the one then and even yet in vogue—the pressure or heated-air system—known as the "Plenum." This system would have been at the time wholly satisfactory to myself and the Board of Education if it had not been considered rather expensive. With a view merely to greater economy, I started out to find some method of ventilation that would be at once reasonably economical and effective. In the course of my inquiries, I discovered an expert engineer in this city whose system appealed to me so strongly that I determined to embody it in my specifications and recommend it to the Board of Education. I might say here, that this system was new to me and that the theories upon which it was based was somewhat in conflict with the ideas of ventilation held by myself at the time and by other architects. I watched, therefore, with unusual interest the result of the innovation, and it is naturally a matter of congratulation that this result proved to be even more satisfactory than I had expected. The results were so thoroughly satisfactory that under the instructions of the Board of Education, I installed the same system in another school-building that was erected during the past season.

"The main features of the system are an ample supply of outdoor air, supplied by a natural-air movement without objectionable drafts. The windows are utilized for the screen intakes which are easily controllable and in a degree automatic in action. The vitiated air is carried out by suitable ducts, with the outlet near the ceiling.

"It is not the least of the merits of this system that it allows the opening of the windows freely, when the outside temperature makes it suitable.

"**The necessity of closed windows in the working of the plenum system has been one of the most objectionable features of the system,** and in this city, at least, has awakened the strongest protest on the part of the teachers resulting in an order by the superintendent that the windows be opened three times daily and the room flushed with fresh air. **It is needless to say that this action is a virtual condemnation of the system.**

"It is hardly necessary to emphasize the importance of good ventilation, more particularly for children in the public schools. Having made a specialty of school-architecture, I found in this important matter of ventilation a problem, the solution of which was difficult to find in the general practice or in the text-books. That it has been my good fortune to discover and to be the first to adopt a system that gives promise of being the ideal system of the future is naturally very gratifying.

"In any system of ventilation, however simple it may be, the element of individual control is important, and it is a matter of congratulation that in this important first test of this new method the intelligent conscientious care and management on the part of Superintendent of Schools William R. Wright, and also of Janitor Roberts, left nothing to be desired. As the matter stands, so far as my own knowledge and observation goes, the Lynch system in the Benton Harbor Schools represents the highest phase of school-ventilation."

CONVENTION DATES.

January 17 and 18, 1911.—The 17th annual meeting of the Wisconsin Master Plumbers' Association, at Green Bay, Wis. The officers of the association are: President, George F. Reeke, Green Bay, Wis.; vice-president, Louis Sonntag, Sheboygan, Wis.; secretary, P. H. Ryan, Appleton, Wis.; treasurer, Fred E. Green, Janesville, Wis.

January 17, 18 and 19, 1911.—The 21st annual meeting of the Iowa Master Plumbers' Association, at Waterloo, Ia. The board of directors will meet January 16th in the same city. The officers of the association are: President, J. F. Garvey, Mason City, Ia.; vice-president, C. G. Bosch, Burlington, Ia.; treasurer, J. F. Gearen, Sioux City, Ia.; secretary, H. B. McCarten, Dubuque, Ia.; organizing secretary, J. A. Farrell, Des Moines, Iowa.

January 24, 25 and 26, 1911.—The 17th annual meeting of the American Society of Heating and Ventilating Engineers, in the Engineering Societies' Building, New York City. The officers of the society are: President, J. D. Hoffman, Purdue University, Lafayette, Ind.; first vice-president, R. P. Bolton, New York City; second vice-president, S. R. Lewis, Chicago; treasurer, U. G. Scollay, New York City; secretary, Wm. M. Mackay, 113 Beekman St., New York City.

January 25 and 26, 1911.—The 19th annual meeting of the Illinois Master Plumber's Association, at Springfield, Ill., with headquarters at the St. Nicholas hotel. The officers of the association are: President, Frank U. Patterson, Springfield, Ill.; first vice-president, W. J. Hilliard, Elmhurst, Ill.; second vice-president, C. D. Brownell, Champaign, Ill.; treasurer, Wm. Schlegel, Belleville, Ill.; secretary, W. C. Haviland, Aurora, Ill.

February 6, 7 and 8, 1911.—The sixth annual meeting of the American Society of Inspectors of Plumbing and Sanitary Engineers, at Milwaukee, Wis. The officers of the society are: President, W. G. Williamson, Detroit, Mich.; first vice-president, Edw. F. Kane, Wilmington, Del.; second vice-president, C. I. Putts, Jr., Baltimore, Md.; secretary and treasurer, Thos. J. Claffy, 215 Madison St., Chicago.

June 5, 6, 7 and 8, 1911.—The 23rd annual convention of the National Association of Master Steam and Hot-Water Fitters. Place of meeting not yet decided upon, but it will probably be in Chicago. The officers of the association are: President, Charles A. Geoghegan, New York City; vice-president, Edward B. Denny, Newark, N. J.; treasurer, Juan A. Almirall, New York City; secretary, Henry B. Gombers, 260 West Broadway New York City.

Roughing-In Stacks and Branches—IV.

By Henry D. McCormack, C. E.

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ROOF FLASHINGS.

Wherever a pipe passes through a roof, some means must be provided for keeping rain from entering the building through the opening. Naturally the means adopted will depend to a great extent upon the kind of roof, for it stands to reason that a method which would be perfectly satisfactory in the case of a shingle roof would not be applicable to a metal roof, and neither the means adopted on the shingle roof or the tinned roof would be suitable for a slag or tarred roof. The protection against rain where pipes pass through roofs is called flashings, and consists of making and setting in place a protective shield of sheet metal, which can, in some manner, be made tight to or around the pipe, and so soldered or otherwise interworked to the roofing material as to make a watertight bond.

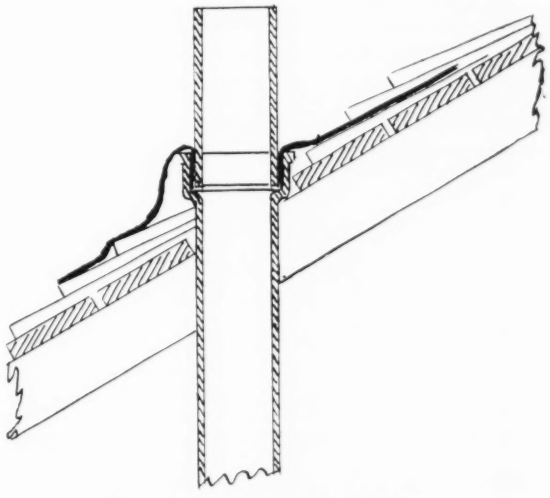


Fig. 11. Simple Method of Flashing.

A simple method of flashing shingled roofs, which is followed quite generally throughout the United States, is shown in Fig. 11. With this method a double-hub piece of soil pipe is cut of such length that when set in place the top of the hub will project but slightly, say one-half inch, above the upper side of the pipe-opening through the roof, as shown in Fig. 11. This length of pipe is then calked in place, after which a piece of sheet lead is slipped up under the first row of shingles above the pipe a sufficient distance so that the second row of shingles will overlap, and not let rain water beat up beyond the flashing to follow down under the sheet lead into the building. Once the sheet lead is in place—and it might be necessary to clip a couple of the shingle nails before the sheet lead can be placed—the workman commences to beat the lead down on the lower side, until it lays with a snug fit close to the pipe hub. When beating the lead, care must be exercised not to work it too thin where it rests on top of the hub. If the work is done heedlessly, without easing up on the flashing while working it, the plumber will find to his disgust that, just when the lead begins to fit around the pipe, the top edge of the hub is either peeping through or the lead is so thin that the flashing is no good. As soon as the lead is worked nicely into place the sides and lower edge can be tacked to the shingles with short nails having large heads. After this a round disc can be cut from the flashing over the center outlet of the pipe, leaving about 1½ inches on all sides to be worked down inside of the hub, as indicated in the illustration. The next step is to find or cut a piece of pipe of the required length to top off or finish the vent stack, and this piece of pipe must be calked into the hub which projects above the roof. Great care must be exercised in calking the joint and the lead must not be too hot when pouring, or all the previous good work will be spoiled. If the calking-lead is too hot, it will burn a hole right through the flashing where it comes in contact, and after the joint is safely poured careless use of the calking tools will cut through the sheet lead. This method of flashing pipes requires considerable skill in sheet-lead working in order to beat the flashing on the lower side of the pipe down to the roof surface. Evidence of this statement may be seen on the roofs of many buildings, where the sheet lead is humped and buckled as though dressed into place by a helper.

A method of flashing devised for the benefit of those who cannot work sheet lead is shown in Fig. 12. This method is most easily applied to a one-half pitch roof, but may be used in connection with roofs of any angle. Instead of extending the soil stack vertically through the roof, a one-eighth, one-sixth or one-sixteenth bend, as the case may require, is calked on the pipe, and the face of the bend is turned so that it is parallel with the plane of the roof, as shown in the illustration. The sheet lead flashing is then worked up under the shingles, as in the former case, but in this instance it lays almost flat on the roof and requires but little beating to work it into place. After it has been tacked down to the shingles, as previously explained, another one-eighth bend, or one-sixth bend, or a bend of whatever angle is complementary to the one already in place, and will turn the stack again in a vertical direction, is calked into the hub of the protruding bend. After this is safely accomplished, a short piece of pipe may be calked into that bend to give finish to the pipe and complete the stack. Before working the flashing in place with this method, and before the second bend is calked into the hub, a brace or support should be placed at *a* to prevent the pipe being driven inward from the flashing by the force of the blows used in calking. This is a more expensive method of flashing than the one previously described, as it necessitates the use of two additional fittings and the two extra joints. To partly

offset this additional cost, the roof can be flashed much quicker, for it takes much less time to work the flashing into place. On the other hand, this method interposes an offset in the stack as against a straight pipe in the former method. At all events, the offset, or one-eighth bend, method, as it is sometimes called, is used to a considerable extent throughout the country, and may well be kept in mind.

Both of the methods described in the foregoing paragraphs necessitate the cutting of pipe and using of pieces on which there are hubs. In the method about to be explained, the process is much simpler, less expensive and odd pieces of pipe having no hubs may be used. This method is shown in perspective in Fig. 13, and may be used on roofs of any pitch from flat roofs upwards. In the first place, a short piece of lead pipe, *a*, made out of sheet lead, is formed around a length of soil pipe of the size to be used. This lead pipe or "collar" is made sufficiently loose so that it will easily slip over a length of pipe. The lower end of the lead pipe is then cut at an angle having the same pitch as the roof on which it is to be used, and it is next soldered to a piece of sheet lead, *b*, which is the flashing proper. This made-up flashing is placed on the roof above the outlet cut for the vent stack to pass through, and a piece of soil pipe, without a hub, is slipped through the collar of the flashing and calked in place. The workman then mounts the roof, fastens the flashing to the shingles by means of nails, after which he makes the flashing watertight around the pipe. To do this the top edge of the collar is worked out, so that a ring of putty, white lead and lamp wick can be inserted; the collar is then bent back into place, thereby forming a bead, which is packed full of the plastic material, which effects a seal.

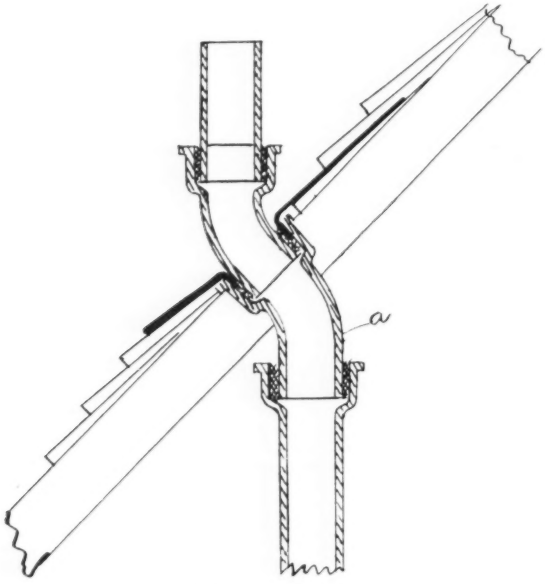


Fig. 12. Flashing for Non-Lead Workers.

Up to the present time the flashings described are for use in ordinary climates, where the weather is not extremely cold. In the far northern latitudes of America, however, the weather is so cold during winter months that hoar frost will collect in soil, waste and vent stacks flashed in the ordinary way, sometimes completely obstructing the outlets. This formation of hoar frost can be checked to a great extent, and sometimes entirely prevented, by using a flashing similar to the one shown in Fig. 14. In this method of flashing a hubbed piece of pipe is used, but, instead of keeping the top edge of the hub even with the upper side of the outlet cut through the roof, it is extended the full height to which the stack is to be extended, which should not exceed 18 inches. A collar is then made, as in the case of Fig. 13, but, instead of the collar fitting the pipe, it is made sufficiently large to slip over the hub. In consequence of the extra large size, when the flashing and pipe are in place, there is an annular space of about 1 inch all around the pipe, between the iron and the sheet lead. The hole through the roof must be cut correspondingly large; then, when the plumbing installation is in use, and the building occupied, the hot air which rises to the attic will fill the space between the pipe and the flashing, thereby maintaining a sufficiently high temperature to prevent the formation of hoar frost within the pipe.

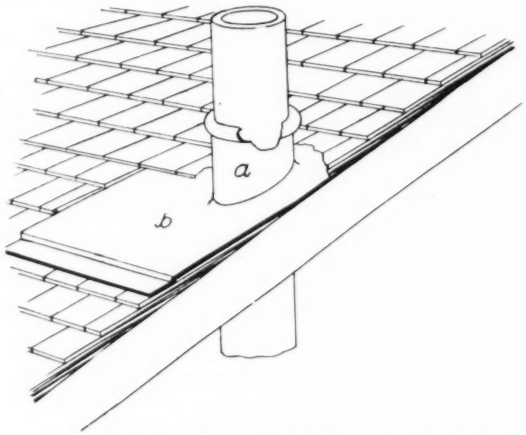


Fig. 13. Flashing Without Cutting Pipe or Using Hubs.

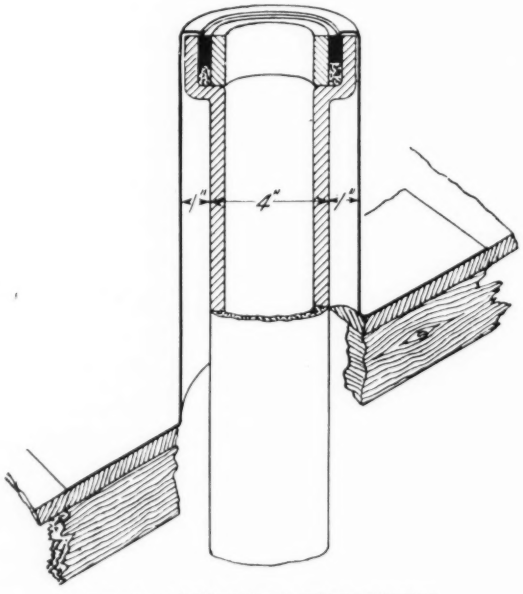


Fig. 14. Flashing for Northern Climates.

At the top edge of the soil stack the sheet lead of the collar is turned over into the hub, where it is calked securely into place. In order to calk the flashing in the hub a short ring of pipe, of about the depth of the hub,

must be cut from length and calked in with the flashing. When this form of flashing is used the stack should be stayed well, just below the roof beams, to prevent its being swayed by the wind or moved from its position by other forces.

In buildings where the wrought-pipe system of drainage is used, the pipes may be flashed by the method illustrated in Fig. 15. Of course, as the wrought pipe is made up with screw threads, any of the other methods which require the lead to be calked into joints cannot be used.

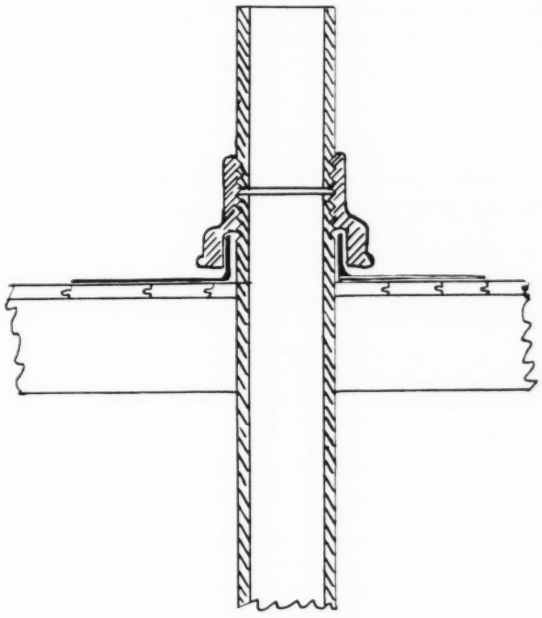


Fig. 15. Flashing for Wrought-Pipe System.

No system of drainage would be complete in itself unless some means for flashing the roof was devised, so that soil, waste and vent stacks of that material could be made tight where they pass through the roof. This is equally true of the wrought-pipe or Durham system of house drainage, and to meet that requirement a special fitting has been designed. The method of flashing a roof where a wrought pipe passes through is shown in the illustration. A special coupling, which has an especially deep recess outside of the thread line, is what forms the seal. In order to use this method a length of threaded pipe is screwed in place so that the top will project the right distance above the roof level. A lead or copper flashing, made up with a collar slightly larger than the pipe, having first been set in place. The recessed coupling is then screwed onto the pipe, as shown in the illustration, thereby completing the flashing of the pipe at this point. If it is desirable to extend the stack higher than this point, a piece of pipe of suitable length can be screwed into the coupling. It is desirable, or even necessary, to have this flashing coupling a sufficient height above the roof, particularly on flat roofs, so that water cannot back up and overflow the collar into the building. Six inches, no doubt, will be a sufficient distance in most cases.

No treatment of the subject of roof flashings would be complete without some reference being made to adjustable roof flanges. The roof flashings previously mentioned are all made by workmen on the job. Within recent years, however, roof flanges manufactured in a shop and made adjustable, so as to be adaptable to roofs of any pitch, have been put on the market and mark another step in the direction of manufactured goods in the plumbing business.

(To be continued.)

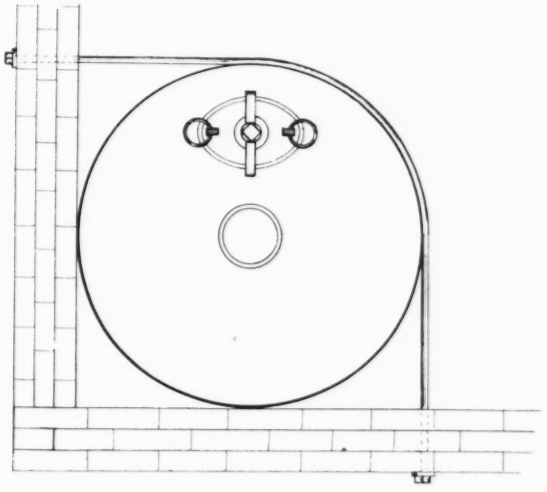
BRACING A TANK.

By W. H. Wakeman.

The large circle in the illustration represents a tank located in a corner of my boiler room. It is made of boiler iron to insure durability, but no pressure is carried on it. The smaller circle near the center represents a 3-in. pipe through which steam at low pressure escapes to the atmosphere. An inlet pipe is located near the bottom, and an outlet pipe is provided at both top and bottom.

Very hot water is discharged into this tank, from which steam rises rapidly, then the water runs into the sewer. As originally set, this tank would shake badly when in use, caused by hot water coming into a cool tank, and by the agitation of this water after the tank had become heated. This caused violent vibration of the connecting pipes, which was both annoying and dangerous.

A hole was drilled in each brick wall forming the corner. Threads were cut on both ends of an iron rod 5/8-in. in diam., and nuts fitted to them. A good die and tap such as ought to be found in every plumber's and steam-fitter's outfit, was utilized for this purpose. When the rod was in place as shown, a washer was put on each end and the nuts screwed on. This prevents all vibration



Bracing a Tank.

and proves satisfactory. Any good helper can do a job of this kind, as there is nothing complicated about it requiring skilled labor, or mechanical training, and the results secured are well worth several times the cost of doing the job.

A Pertinent Question.

It is taking some time for the flood of stories anent the discovery of the North Pole to sweep past. Along comes this belated one from old Kentucky.

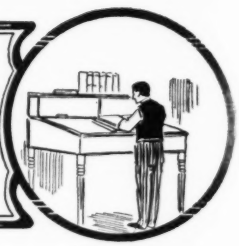
The owner of a plantation said to a favorite darky:

"Mose, they've discovered the North Pole."

"'Deed!" exclaimed the old negro. "Where at?"—Everybody's Magazine.

BUSINESS MANAGEMENT

NEW METHODS FOR OLD



"ESTIMATES FURNISHED FREE."

Editor "Domestic Engineering":—Most every master in the business believes that it is a decided advantage and a big hit to have the legend, "All estimates furnished free," on his business stationery, and perhaps on the show-windows also.

In the first place, if the master is up to snuff, the estimate is not furnished free, for it has been figured into the general expense and in such a case, someone else is paying, or has paid for that particular estimate that he last figured upon. So why continue the deception? Looking at it from another angle, it can be said that no one yet ever fully appreciated the thing that they got for nothing. So why continue to throw this bluff about free estimates?

Still another class of people are so constituted that the more you give them, the more they expect of you. So, again, why continue to advertise the fact that you are an easy mark?

Thinking these matters over some time ago, I came to the conclusion that the best thing I could do was to remove that sign from my business stationery and I have done so. These few words I write as a little lesson on the jewel of consistency. Consistency.

THE PLUMBER AND THE HARDWARE-MAN.

Editor "Domestic Engineering":—I notice that there have been several letters of late, relating to this supposedly valuable accession to our ranks and I would like to give them a few things to chew upon. One of the main arguments of the opposing clan seems to be that the hardware-man is a better business man than the plumber. This may be true in many instances, but if he is such a crackerjack of a business man, why has he suffered the hot-air furnace business to go to the point that it has reached? Time was when there was some money in the furnace business. Is it so to-day when an installation will be made for a profit of ten dollars or less? The hardware-man (good business man that he is perhaps) has been guilty of the very thing that has caused the downfall of many a plumber, viz., cutting prices to get the work. He has got a limited knowledge of heat anyway, and when he attempts to figure up a job it is an even bet that it is shy on results. He does not, and has never had the name of employing first-class mechanics at the plumbing and heating end of his business. In the past 20 years (and they have been monkeying at the plumbing business for that length of time) this same hardware-man has never been able to get it through his head that our crafts were separate and distinct branches. What he wants is a man who can (and will) do everything. Look at the "ads" inserted for workmen in some of the trade papers. They read about like this:

"Wanted—A first-class tinsmith and plumber. One that can do hot-water heating, steamfitting and gasfitting. Steady work the year around. Wages $18 per week."

There you have three separate trades to be united in one man for which he is to receive the princely sum of $18 a week; less, in some instances, than helpers are paid in our crafts. This is not all. Should there ever be a time when there is nothing doing in the tin-gas-plumbing-steam-shop, the unhappy occupant will be requested to either go behind the counter and sell rat-traps, or hike to the country and stick up a windmill or two.

Nor does the hardware-man make a good association member. He either has not time to attend, or believes not in the plumbers' associations, or he is tied up to his own associations. The hardware-man does not seem to be able to recognize plumbing and steamheating as a business, but thinks of it rather as a trade on a par with his tinning shop, and until the time comes when he shall acquire a much broader outlook than he has at present, I, for one, fail to observe how he is going to be of the slightest aid to the plumbing and steam and hot-water business. Trusting that you may see fit to publish this letter, I remain,

"Lead Pipe."

WHY NOT KNOCK OUT ONE CAUSE FOR CALLING THE PLUMBER A ROBBER?

Editor "Domestic Engineering":—On some parts of repair work there is simply nothing to it from any standpoint. Take the case of putting in a new fuller ball. It is a job that any kid, 12 years old, can do after he has seen it done two or three times. Why not educate the householder to do this for himself? Suppose that you have to send a journeyman to do the job? He will make it last two hours, anyway, and the job will cost the owner anywhere from two to three dollars. Do you blame him for kicking at that price for a job that really is not worth more than a quarter at the most I do not, for I know that I would make a howl myself? On small repairs there is not one dollar in it for the master if he charges what the job should come to from the householder's side of the question. Replacing a closet bowl or tank is quite another matter. Now, I had sooner sell the fuller ball for fifteen or twenty cents and let the owner fix the thing for himself and keep my mechanic busy on other work, than to send him on any such job. Packing radiator valves is another thing that might be put in the same class with the fuller ball.

I have noticed that these two things seem to raise hob with the customers, and I see no reason why they should continue to give trouble along the same old line forever.

I trust that you will see fit to let this letter go in the paper, as I should like to have the opinions of some of the others in the business. G. G.

WANTS TO KNOW.

Editor of "Domestic Engineering":—I have installed several vapor jobs this season for the first time and I would like to know if the heating trade generally considers these more economical than hot water for residences? I would be very glad to receive information through your columns. I have been a subscriber to your paper for the last two years and consider it a great help. Very truly yours,

Maryland. L. M.

YE OLDEN-TIME PLUMBING TALES.

By W. H. Prescott.

There is, perhaps, no more famous (of its kind of fame) spot in the East than "The Bamboo Tree." There's only the one tree, too, mind you; and it's at the foot of Pine street, Camden, N. J. It is known to many "hobo" plumbers and steamfitters, "traveling the East" in search of "jobs"—and to say "I've been 'Under the Bamboo Tree' " is as good as saying "I've traveled" to these same "tramp" plumbers, broken-down gasfitters and rum-soaked allied craftsmen.

Here one morning the "Bewailer of Good Old Plumbing Days" was found—seated on an old laundry carrier, under the bamboo tree—king, as it were, of the motley group scattered around.

"Blest if there isn't young Chino!" the veteran plumber exclaimed, as a red-faced huckster came down the path from Gordon's corner—"Gee! boy, how they goin'?"

"I feel just like the breaking up of a hard winter, dad," responded Chino, Jr. "I slept in the lumber yards last night and some blankety blank stole my kicks."

"Plenty more shoes, kid," said the old man. "Just go down to th' 'dump' and pick out what you want—City emptied over forty wagonloads o' junk last night; you ought to find a pair of Romeos."

"Sure, thing," assented Chino, Jr. "Say, dad, when did you say you met my old man last?"

"Day before he died, kid. Aye, me! that must be nigh thirty years ago—when you was in th' soap-box cradle. I tell you boy, those were the palmy days of plumbery, and don't you forget it! Why, son, your dad, with his push-cart plumbing shop, could put 'em all to sleep, and don't you forget it!"

"Well, before you start in to tell me about it, pop, let's chase the duck. I'm as dry as a furnace and as thirsty as a pump! Here Kaney—go get a dime's worth of sudes!"

A rough-bearded tin roofer took the "kettle" and dime and fairly flew up to Gordon's tavern.

"Yes, son," continued the "Veteran Bewailer," "them was the juicy days of plumbery! Why, your dad was in Haddonfield one day with his push cart shop and Harry Scovel's water-back blew up with a genuine Fourth of July bang. Seems though Providence did it just because Chino'd struck the village. He was passing the house when it happened and when he heard the pop! sizz! bang-it-t-bang! he ducked, naturally. Thought some one he had done a job for was taking a shot at him. Then a big Tom Cat, with scalded hair fell at his feet and began clawing his socks. Then part of the kitchen fell out into the yard; there was steam to burn; plaster and shingles to give 'way, and the explosion was over. By the time the steam and dust had lifted Chino had his tools lined up, ready for work. 'I'll be called; I know I will,' says he. And he was. At least ten excited people stood on the house steps calling for him—as well as on Heaven, the doctor, and undertaker. 'Get who you please, of course,' says Chino, 'but I'm the plumber. Want your water back repaired—or will you have a new one in?' 'You can put me in a new one,' says the hired girl— but you see she was too scared to know whether she wanted a water back or a pull-back. Well, Scovel knew Chino; so he says 'Come in and fix her up,' and Chino butts into the job—'where is the little water back?' says he, looking for it where it had once been. 'Oh, there you are,' he says, as he sees it up on the top of Widow Jone's house. 'I'll get you, my little piece of hardware!' 'No, you won't, man!' says the Widow Jones. 'Don't you dare climb on my house, man. If you do—' and she shook a stove poker towards him, 'I'll—I'll strike you! so there, now!' 'I'll fool'er,' says Chino, and with that he struck on a run around the house, the Widow' after him. 'Lap one! judgment! yells Chino as he made the first round. He yelled on the second, third, and fourth laps, and then there was no Widow. Her

"He Struck on a Run Around the House, the Widow After Him."

wind gave out on the three—and three-quarters. Thus Chino had her. Up he clambers the porch, skins up the roof, rolls the water back to the ground, slides down safe to home and makes off to Scovel's with the prize just as the Widow yelled, 'Come back you loafer! I've got me second wind!' "

At this point Kaney appeared with the "duck" and a handful of pretzels.

As the "Great Bewailer" raised the big dinner bucket to his mouth he dizzly remarked: "This ought to be good for rheumatism, son."

"Why so?" asked Chino, Jr.

"Its full of hops," was the answer, whereat Chino, Jr. let forth a roar of laughter that brought four of the nearby stablemen out to see the fight." They went back dejected—no fight, for once.

The bucket and contents were passed around to such comments and remarks as: "How's work in Pittsburg, Mike?" "On the hog." "Where you been, Bandy? hain't seen you since we was on th' job at Reading?" "Down Lantic City. Nothing doing—so's come up here." "Where's Biggie Larkins—workin'?" "Naw! doin' thirty days," etc., etc.

And then "Good Old Days of Plumbing" opened up again. "Son," he said to Chino, Jr., "'fore I go up town and touch Harry Farrel for a five-cent lunch, let me tell you a jaunt your dad took to Merchantville. Rich folks out there, kid—but they're hard-hearted—saw wood or you don't get a handout. Well, in the good old juicy days of the pipe-and-joint biz your dad struck out one Christmas for Merchantville. Had his cart on runners and the wheels on the cart; double turn, see? Moseying along the pike he sees a stone on which was painted 'Roll me over.' Chino sized it up. 'Darned if I ain't been rolled many's the time,' says he, 'but blanked if I ever seen a stone yelling for it. Well, here goes,' and he

pried over the stone with a piece of gas pipe. On t' other side he read, 'Now, roll me back—and I'll fool some other sucker.' On Chino goes—stung—until he reaches the house of two sisters; old maids; rich and all that. Had a Christmas tree in the parlor for the dogs, cats, parrots and chickens to look at—but no kiddoes. Seein' as Chino was a steamfitter and plumber they called him in. 'We have a chickenery,' says Angelina, the elder old maid sister, 'and we've put settings and settings under the hens but the eggs won't hatch!' 'Yes,' says Anastasus, the less elderly old maid, 'do you 'spose laying hot pipes under the nests will incubate the eggs?' 'Show me the hennery,' commanded Chino. They did. He sized up the flock with cold, critical eyes. 'Well?' says Angelina, 'do the hens need hot air?' 'Not on your tintype, lady,' says Chino, 'they need a boy hen—a rooster. Two dollars, please, for consultation and advice.' Blushing, as does the red, red rose, the two virgins paid over the dough."

There was a few moments silence—and then Chino, Jr., said: "Pop, did my dad have to do all them things you're telling me of?"

"Sure."

"And he was a steamfitter and plumber, eh?"

"Yep."

"Well, then, I'm blanked glad I'm a huckster!"

NEWS FROM PITTSBURGH AND VICINITY.

The Moss & Blakely Plumbing Co. will be the name of a new corporation to enter the plumbing field in Pittsburgh at an early date, for on Dec. 19 an application will be made for a charter for this concern under the laws of Pennsylvania. The incorporators will be John P. Moss, F. J. Blakely and Harold Mantle. The firm is being organized by Ralph & Schreiner, attorneys, of this city.

The plumbing work in the new $4,000 residence of A. T. Bortz, of Swissvale, is being done by the Swissvale Plumbing Co. The contract has just been let.

Notice has been given in legal form that the partnership heretofore existing between H. C. Lantz and Richard O'Brien, doing business as the Verona Plumbing Co., in the town of Verona, 10 miles from Pittsburgh north on the Allegheny river, has been dissolved, but the business will be continued by Richard O'Brien, who is receiving and paying all accounts accruing now.

William Murphy, who is erecting a new $4,000 residence in Wilkinsburg, has let the plumbing work to the S. M. Dick Plumbing & Heating Co., in that city.

Thomas McCaffrey, who is building four new houses in Pittsburgh, has given the plumbing contract to Reynolds Bros. in this city.

The Barlow Hardware Co., of Corry, Pa., has secured the plumbing work in the new $5,000 bungalow being erected at Corry by George W. Sullinger.

Contracts have been signed between the First Methodist Episcopal church of Warren, Pa., and the Pickett Hardware Co., of Warren, for the plumbing and heating for the new church which is now under course of construction in that city.

Deely & Hafner have been given the plumbing in the new $2,000 residence now being built by Mrs. Richard Neff of this city.

Contractor E. Robinson has received the plumbing work for the new $5,000 home of P. F. W. Bithell.

The Davis Co., which has been doing an extensive mantle business, was dissolved Nov. 14th and a new partnership to carry on this business has been formed between Irene Fetzer Herrick and W. H. Fetzer, who will maintain offices in the Fulton Bldg.

I. W. Jenks, Pittsburgh, has given the plumbing contract for his new $3,500 residence to the East End Plumbing and Electric Co.

The Pittsburgh Builders Exchange has inaugurated an employment bureau in connection with its general offices in the Lewis Block, and employers of all kinds of skilled labor obtain help through that source without charge.

Eben B. Clark, Pittsburgh, has given the Snively Plumbing Co., the heating contract for his new residence.

There is considerable small building going on in the immediate Pittsburgh district, and quite a number of small plumbing, lighting and heating contracts will be ready to bid on at an early date. These contracts are for moderate-priced homes, the majority of which are being erected in the suburbs.

J. G. McLain has started the erection of sixteen houses and the lighting contracts for these have gone to the South Hills Chandelier Co., Knoxville, Pa.

The Highland Mantle Co. has been formed here and an application will be made for a charter at Harrisburg, Pa., Dec. 22. The company will also do a general lighting-fixture business. Stocks of various lighting lines and their usual sundries will be carried. Louis F. Adelman, 316 Bakewell Bldg., is at the head of the new company.

A good heating, lighting and plumbing contract will be ready to be let soon by the Republic Iron & Steel Co., Pittsburgh, which concern is about to start the erection of an eight-story office building at Youngstown, O. The building will cost $75,000. MacClure & Sphar, of the Keystone Bldg., Fourth avenue, Pittsburgh, have the plans.

The White Plumbing Co., Charleston, W. Va., have moved into their large new building at Charleston. Besides doing a general plumbing-contracting business the firm has gone into the lighting-fixture, heating and bathroom-supply business upon an extensive scale. All business is now being done at their new place of business.

The plumbing and heating contract for the W. T. Thomas residence at Sharon, Pa., which will cost $8,000, has been secured by Caldwell & Semple, Sharon.

Plumbing in the large warehouse being erected on the South Side, Pittsburgh, has been awarded by M. Lanz & Son, to W. N. Sauer in this city.

One of the best contracts let during the past fortnight has been secured by the Pittsburgh Plumbing & Heating Co., which will do the work in nine modern dwellings being erected on the North Side by J. Texter.

Fred Minum, Meadville, Pa., has awarded the contract for the plumbing work in his $3,500 residence to L. L. Lord, Meadville.

Gardner Bros., Elwood City, Pa., will do the plumbing work in a new $4,000 garage being erected there by Blackburn & Turner, of that city.

Pittsburgh plumbing, heating and lighting contractors are greatly interested in three large church contracts which are to be awarded within a short while. At New Castle there will be a $16,000 church erected by the St. Michael Greek Catholic congregation, and at Rochester, Pa., the First M. E. Church will build a new house of worship costing $40,000, of which C. C. and A. L. Thayer, New Castle, Pa., are architects. The same firm have the plans for the new $25,000 Christian church building, which is to be erected at East Liverpool, O. For Butler, Pa., the same firm of architects have the plans ready for a $15,000 addition to the Second Presbyterian Church, of Butler.

Charles Zang, the well-known plumber at East Liverpool, O., has always been active in the councils of the Central Basket Ball League, which is composed of eight towns in Western Pennsylvania, and he is being sought again as referee for these games. After Zang finishes his work at East Liverpool he hops on a train and comes to Pittsburgh and goes to the place where a game is to be played that night. Following the game, he returns home on a midnight train and is "on the job" bright and early the next morning. He has served as a referee in this league for the last three years.

The Baby.

"So, that's the baby, eh?"

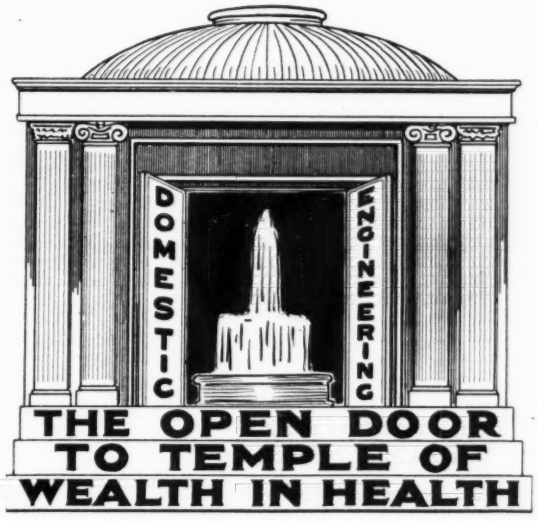
"That's the baby."

"Well, I hope you will bring it up to be a conscientious, God-fearing man."

"I am afraid that will be rather difficult."

"Pshaw! As the twig is bent the tree's inclined."

"I know, but this twig is bent on being a girl, and we are inclined to let it go at that."—Houston Post.



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NOTICE TO ADVERTISERS.

Copy and cuts for advertisements intended for a particular issue should reach the office of Domestic Engineering on Monday of the previous week if it is desired that a proof of the advertisement shall be submitted. New advertisements can be received up to noon of Monday of the week of issue, but no proof can be shown.

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SPECIAL NOTICE TO READERS.

Our readers are invited to send in articles on any topics covering sanitary interests as outlined above. Photographs and drawings with descriptions of special interest to plumbers and steam-fitters are welcomed. "Domestic Engineering" pays at space rates for all articles, notes, criticisms and news data so contributed.

Among the Wholesalers

WILL DEAL IN BATHROOM SUPPLIES.

The Peerless Pacific Co., has been organized to deal in bathroom supplies at 43 Front St., Portland, Ore. The new business, which has just been started, is in charge of R. J. Smith.

HAVE STARTED A PLUMBING-SPECIALTY BUSINESS.

James T. Gray and Peter Mahony, who both have been conducting successful plumbing establishments in Detroit, Mich., have formed the Wayne Mfg. Co., and opened a plumbing-specialty business at 282 Michigan Ave., in that city. The officers of the new company are Jas T. Gray, president; Peter Mahony, secretary, and Ed. T. Flanigan, treasurer.

WILL SOON ISSUE INTERESTING AND VALUABLE CATALOG.

One of the prettiest catalogs ever issued by the Wheeling Sanitary Manufacturing Co., of Wheeling, W. Va., will be ready for the trade January 1. This catalog will consist of 160 pages, and will be handsomely illustrated. It will be the largest catalog ever issued by this concern. Besides showing a complete line of vitreous sanitary porcelain fixtures, it will also contain considerable information for dealers concerning the lines formerly manufactured by the Wheeling Enameled Iron Co., which is not a part of the manufacturing company. The firm is now making three distinct lines. Recently it acquired and is now operating the Riverside Sanitary Pottery of Wheeling, the Avon Sanitary Pottery at Tiltonville, O., and the plant of the Wheeling Enameled Iron Co. at Elm Grove, W. Va. This combination will, after January 1, enable the concern to furnish plumbers everything in these lines which the trade requires.

THE CENTRAL BRASS MANUFACTURING CO.

The steady growth and progress of the Central Brass Mfg. Co., of Cleveland, O., is of more than ordinary interest, as it illustrates the way in which an efficient organization and a liberal and progressive business policy lead invariably to success. This concern began business in 1895 under the name of the East End Brass Foundry, and by strict adherence to the highest standards it has in the small span of 15 years become one of the leading concerns engaged in the manufacture of high-grade brass goods. The name "Central Brass Mfg. Co." was not adopted until 1897, at which time a department of plumbers' brass goods was added to its original business in brass castings and electrical goods. The electrical business was dropped soon after, and in another three years the jobbing foundry was also given up, since which time the company has been concerned exclusively with the manufacture of plumbers' brass goods.

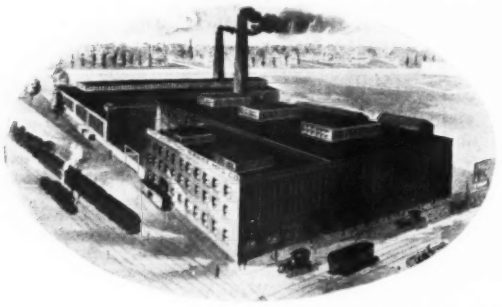
Among the many elements which have entered into the success of the business, the determination to maintain high quality is no doubt one of the most important. It has always been the policy of the Central Brass Mfg. Co. to make price a secondary consideration, and to put the achievement of quality before the establishment of a complete line. As a matter of fact, the latter naturally followed from the former, since the demand, based upon high quality, necessitated extensions of the plant and of the lines as fast as possible.

In accomplishing the result, the Central Brass Mfg. Co. has been wise enough to consider expense secondary to needed improvements in buildings and equipments. Development has come so fast with this concern that at times practically new buildings have been torn down or enlarged. The plant is now one of the largest and most complete of its kind in the country, and the men have all the advantages of clean, spacious, well-lighted and well-equipped workrooms. In this connection it may be mentioned that the output is so large that each man is virtually a specialist in his own operation, which tends to the production of the best possible work.

The layman who visits any high-grade shop cannot fail

to be impressed with the large number of operations involved in making a single high-grade article, and the great care with which each step must be watched. Even men thoroughly familiar with the business are impressed by the careful attention to details in the manufacture of Central Brass goods. The concern has a very well-equipped pattern shop and its patterns are designed, made and gaged with extreme care. Core-making is another point which is considered by some foundries as of minor importance, but which in the Central Brass Mfg. Co. and other high-grade factories is separated into several operations, each one in charge of an expert.

The castings are made entirely of new models. This is one of the foundation principles of the Central Brass Mfg. Co., and it involves the use of the best Lake Superior copper, new pig-tin, and slab-zinc, exclusively. They do not believe that the best results can be secured by any other means, and allow no scrap to be used in any of their formulas. After each casting is made, it has still many operation before it, and has to go through many hands before it reaches and passes the final inspection. The grinding, finishing, polishing and buffing are done by different tools or machines, and by different workmen.



The Central Brass Mfg. Co's. Plant in Cleveland, O.

As the bibb or cock goes through these various stages, many of them subdivided into other operations, the parts are kept true to steel gages and these in turn to a master gage, so that there can be no danger of variation, and the interchangeability is perfect.

Careful inspection and thorough testing under heavy pressure, as near like working conditions as possible, makes it impossible for any article to leave the factory without being perfect in construction, and more than equal to the work it has to do.

There are many other points of importance in ensuring the successful manufacture of brass goods, but space forbids their enumeration and description. The packing, shipping, prompt attention to customers' wants, liberal treatment of trade and consumer, the aim to give satisfaction rather than secure a certain percentage of profit, all these are conspicuous in the general policy of the Central Brass Mfg. Co.

The extent and variety of the company's lines and the fact that most of the men in its sales department have been associated with its business for several years and have the confidence both of the house and of the trade, enable the concern to meet the particular requirements of its customers, and serve them in an unusually satisfactory way. The executive officers of the company have themselves all had experience on the road, and are well-acquainted with many of the trade personally.

It may, no doubt, be expected that this house will make even greater progress in the future than in the past. They have constantly stood for progress in the development and patenting of new types of construction. Their well-known Quick-Pression work met with immediate success when first offered to the trade some years ago, and has steadily increased in popularity ever since. It combines the positive seat, noiseless action and durable construction of compression work with the quick action of fuller work. The makers claim that it does away entirely with the disagreeable thumping and pounding of water-hammer. The plant and executive offices of the Central Brass Mfg. Co. are located at Cleveland, O. Their high-grade brass goods for plumbers and waterworks include complete lines of ground-key work, fuller work, compression work, self-closing work, Quick-Pression work, traps, fittings, accessories etc.

PERSONAL MENTION.

E. L. Walcott has resigned as secretary and managing director of the Modern Iron Works, Quincy, Ill., his resignation to take effect about Jan. 1, 1911, on which date he will take over the management of the Chicago office of the Pacific Flush Tank Co., succeeding the late Sidney W. Miller. Mr. Walcott has built up a good business for the Modern Iron Works while its management has been in his hands, and he will no doubt continue to retain an interest in the concern. It is expected that George J. Fischer, formerly sales manager, will succeed Mr. Walcott as secretary and manager of the Modern Iron Works.

Frank S. Eaton of Woburn, Mass., who is connected with the Dalton-Ingersoll Manufacturing Co., jobbers in plumbing supplies, Boston, and president of the Boston Travelling Plumbing Salesmen's Association, was married on Tuesday evening, December 6, to Miss Irene V. Vidler of Malden, Mass. The wedding took place at St. Paul's Episcopal church of that sity, the pastor, the Rev. William E. Dowty, officiating. There were more than 300 guests present. The bride's sister, Miss Gertrude M. Vidler, was maid of honor, and three other sisters, Misses Minnie N., Bertha B. anad Margaret E. Vidler, with the groom's sister Miss Florence E. Eaton, were bridesmaids. Walter F. Eaton, of Woburn, a brother of the groom, was best man. Following a wedding reception which was held at the home of the bride, Mr. and Mrs. Eaton started on a honeymoon trip to the White Mountains. On their return they will make their home at 454 Lebanon St., Melrose, Mass.

FOLDER DESCRIBING ATTRACTIVE SIDELINE FOR PLUMBERS.

The Plumbers' Woodwork Co., Algoma, Wis., is issuing to the trade a neat folder illustrating and describing its medicine-cabinets and toilet-cabinets. These are made in different sizes with beveled-edge plate-glass mirrors and equipped with two wooden shelves. They are finished in quartered oak, white enamel or genuine mahogany. They are very substantially constructed, and their attractive appearance should appeal readily to the public eye. Plumbers interested in this equipment can obtain circulars and prices upon application to the company.

CATALOG "K" IS O. K.

There is no doubt about it, and you will think so also when you have written for and received the latest triumph of the Kelly & Jones Co., Greensburg, Pa., which is an imposing volume of 454 pages in extent. It is red outside as an indication that it should be read inside. Its index contains over 1,500 classifications, ranging from acid metal-cocks to Y-valves. It would be difficult to conceive of anything more complete. It is really an encyclopaedia of brass and iron goods and specialties for steam, gas, water and oil. This valuable catalog will be sent free to any of the readers of "Domestic Engineering" who care to apply for it. Our advice is to get it now before the stock is exhausted. Mention "Domestic Engineering" when you write.

CALENDARS.

The Elgin Brass Co., Cleveland, O., is issuing a vividly colored calendar to its trade, whose pictorial subject embraces two handsome ladies (we say embraces advisedly). Students of the female form divine can obtain a copy of this calendar upon application of the company. One lady is a blonde, the other a brunette. You can take your choice, but write quickly lest they will disappear.

Correction.—In enumerating the concerns which the United States Radiator Corporation has acquired we last week made the error of mentioning the Sodemann Heat & Power Co. instead of the Sodemann Radiator Works, Edwardsville, Ill. It was the latter company's plant and business which the U. S. Radiator Corporation acquired.

THE METAL MARKET

GENERAL TRADE CONDITIONS.

Business conditions are not as unsatisfactory as pessimistic reports given out by financiers and railway presidents would lead one to believe. The iron trade is undoubtedly dull as the result of an extravagant program of building new furnaces and adding to the productive capacity of the country, and this far more than will be utilized for several years. Railway business is unsatisfactory on account of the freight-rate controversy, but this cannot continue indefinitely. The building industry is fairly satisfactory, the plans filed in New York City in November being in excess of any year in the last five, save 1909, and the decrease compared with last year amounted to less than one per cent. Building in New York City during 1910 will probably be larger than any year in the City's history, save 1909, while, general conditions are especially favorable, no storm is in sight which need be feared by any properly conducted business enterprise run on sound business principles.

PIG-IRON PRODCUTION DECREASING.

The statistics compiled this month regarding the production of pig-iron are most interesting. In the first place the production is the smallest of any month since May, 1909. The falling off in production is likewise the largest of any month since July. It is evident that the manufacturers of pig-iron have been laying up stocks and at the same time, further trouble, during the last four months. More concerted action is now being taken and it is evident that many stacks in the middle West will blow out during the month unless a marked improvement is noted. This can hardly be expected during the month of December and on the contrary it would not be very startling if some marked concessions should be made in prices to clean out some of the surplus, which is already becoming unwieldy. Many sellers are making efforts to effect sales, yet few of any importance have been noted. Prices are stationary. Quotations are as follows:

No. 2 Southern foundry, Birmington	$10.75 to $11.25
No. 1 Southern foundry, New York	15.50 to 16.00
No. 2 X Northern foundry, New York	15.25 to 15.50
No. 2 Plain, Northern foundry, New York	15.25
No. 2 Northern foundry, Chicago	15.35 to 15.85

COPPER STATISTICS IMPROVED.

The statistics compiled by the Copper Producers' Association that were published this week show a marked improvement. Production was slightly less than during the preceding month, and although both domestic and foreign deliveries fell off, the stocks were drawn on to the extent of 9,000,000 lb. At the same time, European stocks show steady decreases and are now only 168,000,000 lb., compared with the high level at the end of February of 242,000,000 lb. In the last four months stocks all over the world have been reduced 72,000,000 lb. This is excellent, and if this condition continues the market will soon be in a healthy state. Sales during the week have been light. Manufacturers continue to buy from hand-to-month, as the metal is needed, but there is no activity shown in the market. Electrolytic is selling at 12.87½ cents and Lake at 13 cents.

PIG-TIN ADVANCED SHARPLY.

Prices of tin continue to advance under the leadership of speculative interests abroad. At the same time both the stocks and the visible supply are being reduced which gives the syndicate a powerful influence. Sales have been made at 38.50 cents, which establishes another new high record since the collapse of the tin market in the latter part of 1907. In that movement the price of tin went to practically 50 cents a pound.

LEAD.

Prices are steady, although there is little new business. The American Smelting & Refining Co. continues to quote shipment lead in 50 ton lots at 4.50 cents in New York. In St. Louis the quotation is unchanged at 4.40 cents.

SPELTER.

Those in control of the spelter market have succeeded in advancing the New York quotation to 6 cents. In the West prices are without change at 5.85 cents. Business is very quiet.

OLD IRON.

There is little demand for scrap, except for stove plate. Quotations for New York delievery are as follows:

No. 1 yard wrought long	$11.00 to $11.50
No. 1 yard wrought short	10.50 to 11.00
Heavy-melting steel scrap	10.00 to 10.50
Machinery cast	11.50 to 12.00
Wrought pipes and tubes	9.50 to 10.00
Malleable castings	12.00 to 12.50
Wrought turnings	5.50 to 6.00
Cast borings	5.50 to 6.00
Stove plate	9.50 to 10.00
Light iron	5.00 to 5.50

OBITUARY.

Matthias Y. Smith, secretary-treasurer of the plumbing-supply house of Hunter & Dickson, 241 Arch St., Philadelphia, died December 6th at his home at Elkins Park, a suburb of that city, as the result of an attack of acute digestion, in his 43rd year. A widow and two daughters survive him. Mr. Smith was deeply interested in church work and was an elder of Jenkintown (Pa.) Presbyterian Church.

Arthur Schlegel, who has conducted a plumbing establishment at 232 South Broadway, Baltimore, Md., since 1871, dropped dead from heart failure on Thursday afternoon, Dec. 1, while directing work at 1522 East Monument St. in that city. Mr. Schlegel's death came as a shock to his family. He left home in the morning seemingly in the best of health, and had been directing his several workmen, when, turning to one of the men to say something, he suddenly fell to the floor dead. Mr. Schlegel was born in Saxony, Germany, Dec. 14, 1846, and came to America with his parents when two years old and settled in Baltimore. Having learned the plumbing trade he opened a plumbing business in that city which he conducted up to the time of his death. He is survived by his widow, three daughters and two sons. He was a member of the East Baltimore Business Men's Association, a director of the Broadway Savings Bank, a member of the Knights of Pythias and ex-president of the Baltimore Master Plumbers' Association.

At the coming meeting of the California State Legislature an appropriation of $19,500 will be asked for in addition to the heating system and $12,500 for a water-pipe line for the State asylum at Stockton. The Sonoma State Home will ask for an appropriation to install a sewer system and septic tank.

"OPEN AIR": A REVIEW.

The world will be quick to recognize as one of the great teachers of today the author of a book just issued, "Open Air"—William E. Watt. This noted educator is well known for his remarkable work as head of the Graham School in Chicago, and as the apostle not of a more strenuous but a larger, fuller life. Dr. Watt lives not in the dust of yesterday, but in the pulsing, throbbing present. Himself a dynamo of exuberant energy and his own life keyed up to concrete-pitch, he has a mission the greatness of which perhaps he himself is not fully conscious—to give to this over-artificialized world the secret of the affluence of perfect health.

The chief concern of this wise teacher is with the young, who have most to gain from his work; but with a man like William Watt, age has little place in the vocabulary, and while none are too young to catch the spirit of this new thought, no one need be too old to learn something at the feet of this Gamaliel.

Now and then the world is glad to pause and listen to some great soul who has a vital message. Now it is the gentle-spirited Wagner who challenges the value of the moribund complexities of our high-strung civilization. Then it is the great-hearted Horace Fletcher, who flashes upon us the unlovely picture of our lunch-counter haste and keeps us from altogether forgetting the sheer delights and larger value of a leisure-table. And, none too soon, comes William Watt to show us on what a low scale we are working our splendid life-forces, and how we may get from life—as he does—a fuller percentage of efficiency—in the larger sense of the word.

As though one were not enough for a single book to carry, Dr. Watt has charged this book with two messages. One message is less obvious than the other, but is even more important; it has to do with our educational system. It is both a warning and a help.

Every generation has the making of the generation that follows it, and its duty to the next generation is hardly second to its duty to itself. That duty has its clearest focus at the point of education—at the school. There is a growing consciousness among thinkers to-day that in our educational work we are badly off the track. There are many who already see a light, and there will be many more when this book finds its way into the homes all over this broad land.

Best of all, the book is not mere theory. At the Graham School, Dr. Watt is demonstrating the truth of what he writes, so successfully that the educational world is beginning to sit up and take notice. His work there is an inspiration. To see it is to be made to feel how great it is to be a teacher—of the new order.

If this city knew its opportunity, it would turn the whole educational business over to this clear-sighted leader, and give him a free hand, assured that he would deliver the goods in the shape of a great boon to the city itself and an object-lesson to the whole country.

There is not a father or mother in all this broad land who intelligently feels the responsibility of parenthood who does not need this timely book—"Open Air" and need it now.

William Henry Lynch.

The Gravy.

A certain Dr. C—— was once reading a very strenuous paper on total abstinence before a clerical club—so the story goes—when the entertainer went out to tell his wife how many she was to provide for at supper.

"What are they doing," she asked, and was told the subject of the essay. "What shall I do," she cried. "Here I have brandied peaches, and it is too late to change."

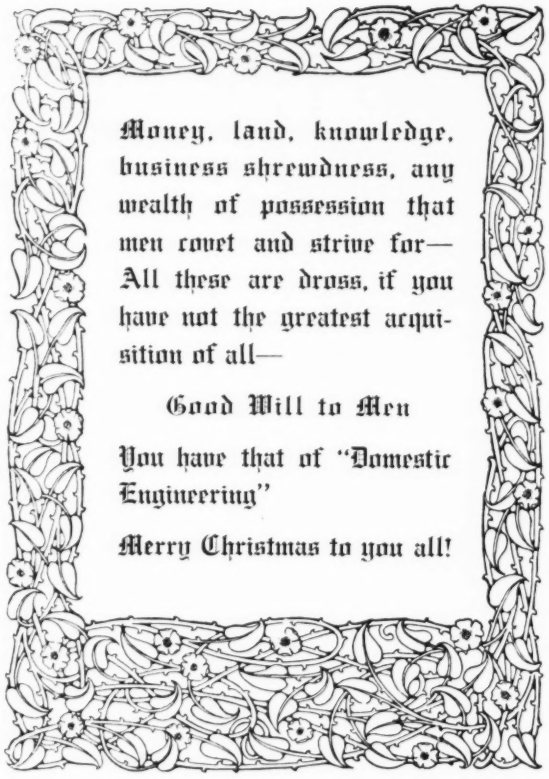
"Make no change," said her husband. "It will be all right."

The essayist had the post of honor at the right of the lady of the house, and she presented him with a dish of the peaches. After a while she said to him: "Dr. C——, won't you allow me to give you some more of these peaches?"

"Thank you," he replied. "They are excellent."

A little later she said: "Dr. C——, may I not give you another peach?"

"No, I thank you," said he apologetically, "but I will take a little more of the gravy."—Harper's Magazine.


Money, land, knowledge, business shrewdness, any wealth of possession that men covet and strive for—
All these are dross, if you have not the greatest acquisition of all—
Good Will to Men
You have that of "Domestic Engineering"
Merry Christmas to you all!

NEWS FROM MILWAUKEE AND WISCONSIN.

Between 75 and 100 Milwaukee master plumbers are expected to attend the coming annual convention of the Wisconsin Master Plumbers' Association to be held at Green Bay, Wis., January 17 and 18. Cards will be issued next week by the Milwaukee Master Plumbers' Association for the purpose of determining the exact number that will attend. At a meeting of the Milwaukee association, held last week, plans for the coming state convention were discussed and considerable enthusiasm was shown. Nominations of officers for the local organization were made and the annual election will be held at the next regular monthly meeting.

Plans are being prepared by Health Comimssioner F. H. Kraft for a complete new plumbing system to be installed in the Seventh-street isolation hospital, Milwaukee. For some time the city has been unable to use a portion of the building owing to its unsanitary condition and it is to improve these conditions that the new plumbing system is to be installed.

New heating and ventilating systems are to be installed in the high school building at Rhinelander, Wis. These systems have been defective for some time, and at a recent meeting of the school board it was decided to remedy the trouble by installing new ones. Work has already been commenced upon the erection of new boiler plant.

The Fiex & Goethel Sheet Metal Works, Milwaukee, is installing a new heating system and a new ventilating system in the plant of the Appleton Coated Paper Co., at Appleton, Wis.

At a recent meeting of the building committee of the board of school commissioners of Watertown, Wis., it was decided to secure an engineer to prepare plans and specifications for a new heating plant to be placed in the Webster school-building.

The G. A. Loescher Hardware Co., Menasha, Wis., has recently completed the installation of a new heating plant in the city hall in that city.

T. Markey has secured the contract for installing a new heating plant in the Park hotel at Johnson Creek, Wis. The contract calls for an expenditure of $1,200.

PACIFIC COAST LETTER

Not in a great many years have builders had such a favorable fall season for building operations and a large amount of work is being done throughout Greater San Francisco, which includes the city proper and the suburban districts across the Bay. There has been but one light rain and this has hindered operations but little with the result that the plumbing trade is quite active at the present time. In Oakland and Berkeley building is especially heavy and not only is there much residence work being done there but a number of fine business blocks are being erected. San Francisco plumbers finding that work is not heavy enough to keep the immense shops now equipped there operating on full time, have turned their atention to the district across the Bay and a number of fine contracts have been secured. Prominent among these is the contract for the plumbing work in the Bankers' Hotel at Oakland, which was secured recently by W. S. Snook & Son. The steel work on this structure is now in place and within a short time the San Francisco plumbing firm will be called upon to install the rough plumbing. Work is being rushed on the eight-story addition to the Realty Syndicate Building on Broadway, Oakland, and the steel work on this structure, which by the way is being erected by a San Francisco firm, is now in place and the plumbing work can be commenced at an early date. A prominent feature of this building will be a rest room on the ground floor where toilets for men and women will be provided. Work on the new Capwell Block will shortly be commenced as will be the erection of the new city hall. San Francisco plumbers are watching both of these projects and are asking that they be allowed to submit bids. In Berkeley several business blocks are being planned as well as many additions to the buildings on the State University grounds. Most of the plumbing done here for the State is done by San Francisco firms who make a specialty of large out-of-town jobs. The small city firms are not enabled to bid on outside work and thus are not in a position to keep busy as are those with extensive facilities.

Within a short time plans will be made for the erection of a permanent city hall on the site of the old structure at McAllister street and City Hall avenue, San Francisco. It is the intention of the board of supervisors to set aside $20,000 as prizes for competition and necessary expenses and invite the submission of plans from architects from all over the country. The new permanent building is to cost about $4,500,000 and as much as possible of the existing foundations must be used in the construction of it.

In spite of the fact that a decision has been rendered by the American Federation of Labor in the dispute between the plumbers and water workers in San Francisco in regard to the laying of the mains for the salt-water auxiliary system for fire protection, the Plumbers' Union has decided not to respect the findings of the body with which it is affiliated on the grounds that it conflicts with the by-laws of the national body of which it is a branch. The federation decided that each craft be allowed to work on the job at the higher wage of the plumbers, $6.00 a day, but the plumbers refuse to live up to the ruling, claiming that they are prohibited from sharing their work with other crafts.

H. D. Connick, an expert in sanitary and municipal engineering, has become a member of the American Engineering Corporation recently formed in San Francisco. Offices have been established in the Mechanics' Institute building, 57 Post St. C. E. Grunsky, formerly city engineer, and later a member of the Panama Canal Commission, is president of the new concern.

The Western Heating Company is the name of a new San Francisco corporation, the company having been formed recently by F. L. Stewart, R. V. Whiting, A. H., L. F. and J. F. Malloran, with a capital stock of $25,000.

The new catalog of the George H. Tay Company will make its appearance about the end of the present month and from the appearance of the proof sheets will be one of the most noteworthy of any catalogue in this line ever issued on the coast.

The plumbing contract for the work on the new Girl's High-School building will be let before the end of the present month.

The plumbing work in the new apartment building being erected by Lillie S. Webb on Scarf street, Los Angeles, is to be done by E. R. Wright for $3,800.

The E. O. Nay Co., Pasadena, Cal., has a large amount of work on hand at the present time, prominent among which is the plumbing and heating work to be done in the new Y. M. C. A. building at that place. This work is to cost $18,000 and the contract is one of the largest that has been let in that city in a long time. This firm is also installing the plumbing in the residence being erected there by Elizabeth Merrifield, this contract being valued at $2,361.

J. Hokum, Los Angeles, has contracted to install the plumbing work in the apartment building being erected at Hoover and Ninth streets, Los Angeles, by D. W. Stewart, the contract price being $3,700.

The Carl Potter Sales Co., Los Angeles and San Francisco, has taken the California State agency for the line made by the Ideal Manufacturing Co., Detroit, Mich. This includes a line of gas water-heaters.

The Hinde Hardware Co., recently opened at Riverside, Cal., with a plumbing department. A regular opening was announced and an orchestra was in attendance to help entertain the great crowd that gathered. Practical demonstrations were made in the plumbing department and this attracted a great deal of attention.

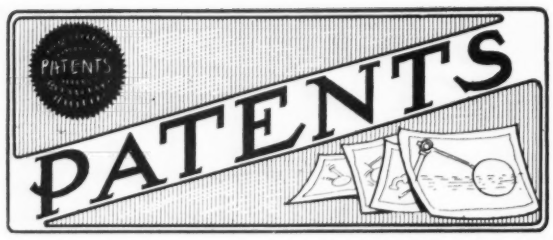
The Union Hardware & Plumbing Co., San Luis Obispo, Cal., has been awarded a contract for furnishing materials needed by the water department of that place.

NEWS FROM OHIO.

Sealed proposals will be received by the board of trustees of the Boys' Industrial School at Lancaster, O., December 20, for the necessary labor and materials for the erection of an additional compressor, piping, etc., for the light, heat and power plant at the institution. The plans and specifications for the work were prepared by Harold M. Bush, of Columbus, O. F. C. Gerlach is secretary of the board of trustees.

Opposition to the ordinance providing for the examination of master and journeymen plumbers, revamped to avoid features which resulted in knocking out a former ordinance, developed in the city council recently and its passage was delayed for a week at least. Councilman Lewis wanted it passed in time to become operative Jan. 1 and suggested that it go through under suspension of the rules. Councilman Sherman objected to the measure on the ground that it created an examining board consisting of the city building inspector and health officer, together with two master plumbers and one journeyman. He wanted the board to consist of the building inspector, the health officer and three plumbing inspectors. As the city now has only two plumbing inspectors, a third would be employed under the Sherman plan. Sherman believes three are necessary and argued that the work of the craft could be better regulated by them than by the board contemplated in the ordinance. Sherman, Mahanna and Heintz defeated Lewis' effort to secure passage. The bill will be considered at the next meeting of the city council. All plumbers who operate in Columbus will have to file applications with the secretary of the board and be examined once a year for a license Master plumbers will be required to pay a fee of $25 a year. Journeymen plumbers will pay $5 a year. Any license may be revoked for incompetency.

The new tenement code for Columbus, O., which probably will be submitted to the council for enactment within the next two weeks, has been not only approved, but heartily indorsed by the Columbus Federation of Labor, which appointed a special committee to look over the code and report back. The committee reported back with an enthusiastic compliment for the code, and the federation is now back of the movement for better housing conditions for the poorer classes. The code has passed the gauntlet of all the city departments and has been unqualifiedly approved.



977,426. Hydrant. Peter E. Apgar, Camden, N. J., and John J. Silk, Philadelphia, Pa. In combination, a stand formed to produce side walls, flanges and a top, the central portion of which is thickened and which is provided with communicating right hand threaded openings, the narrowest part of said top provided with a plurality of holes, a ridge formed with the upper surface of said top, a hydrant casing mounted inside of said ridge, a top having a nut formed therewith and provided with a passage-way, a spout mounted in one end of said passage-way, a valve casing having a vertical valve opening therein, also provided with oppositely disposed inlet and outlet leading to and from said valve opening and also having an opening leading from the valve opening at right angles to the outlet, a valve having a slot therein adapted to communicate with the inlet and outlet and provided with an opening at right angles thereto which communicates with the outlet when the slot is turned away from the inlet and outlet, an extension formed with the valve casing communicating with the inlet, said extension threaded into the upper opening in the top of the stand, a stand pipe having left hand threads on both ends threaded into the outlet in the valve casing and into the passage-way in the top, a key attached to the valve passing through the top, a lever attached thereto, and a supply pipe threaded in the lower opening of the top of the stand.

977,427. Water Pressure-Reducer. Charles G. Armstrong, Orange, N. J.

977,538. Water-Heater. Harry C. Odenkirk, Cleveland, O. In a water heating device, the combination of a base portion, a series of coils arranged one above the other, lugs formed upon the lowermost coil, means for securing said lugs to the base portion, each of said coils being provided with an orifice at its opposite ends, the orifice at one end of one coil registering with a similar orifice in the coil immediately below it, and the other orifice, in the first mentioned coil, registered with an orifice in the coil immediately above it, and lugs formed upon the coils, said lugs engaging with each other when the coils are assembled, whereby the coils are spaced apart.

977,539. Die-Stock for Cutting Tapered Threads. Herman W. Oster, Cleveland, O., assignor to The Oster Manufacturing Co., Cleveland, O., a corporation of Ohio. The combination of a tubular threaded work-holder a die head which has threads engaging with those on said work holder, radially movable dies carried by said head, a cam plate having longitudinally tapered cam surfaces which said dies engage, which plate is capable of being turned relative to said head to adjust the position of said dies, means connecting said head and plate to compel them to rotate in unison, and means preventing the longitudinal movement of said plate.

977,540. Thread-Cutting Mechanism. Herman W. Oster, Cleveland, O., assignor to The Oster Mfg. Co., Cleveland, O., a corporation of Ohio. In thread cutting mechanism, the combination of a tubular chuck adapted to be clamped upon the stock to be threaded, a concentric tube rotatable relatively to said chuck and having a lead screw connection therewith and a substantially radial guide-way, a bearing block supported by said tube in said guide-way and movable therein toward and from its axis, a cutter shaft rotatably supported in said block, means controlling the outward movement of said block, a drum rotatable about the chuck but incapable of endwise movement relative thereto, a train of gears mounted upon said drum a toggle whose links are respectively pivoted upon an axis coincident with the axis of the last gear of said train and with the axis of the cutter shaft, an idler gear mounted on the pivot of said toggle in mesh with the last gear of said train, and a gear in mesh with said idler gear having a tongue and groove connection with the cutter-shaft.

977,541. Die-Stock. Herman W. Oster, Cleveland, O., assignor to The Oster Manufacturing Co., a corporation of Ohio. Threading apparatus comprising a head, radially movable dies carried thereby, a cam plate rotatable upon said die holder and engaging said dies, said cam plate having a laterally extended car through which is an ellipsoid opening, a flange fixed to the die holder and having an arcual slot concentric with the die holder, a post adjustably fixed in said slot, and an eccentric sleeve rotatable upon said post and lying in said ellipsoid opening.

977,562. Valve. William E. Sloan, Chicago, Ill., assignor to Sloan Valve Co., Chicago, Ill., a corporation of Illinois. A valve device comprising two valves one the main valve which controls the flow of water, the other an auxiliary valve for controlling said main valve, the auxiliary valve adapted to be tilted to open it, a stem associated with said auxiliary valve, and an actuating part for moving said stem so as to tilt the valve and means for carrying the auxiliary valve beyond the control of said actuating part.

977,656. Waste-Pipe Cleaner. William P. La Rose, Hartford, Conn. A pipe-cleaning tool comprising a pressure supply-pipe, a bell attached thereto, and a valve closely connected to said bell and for controlling the admission of fluid pressure thereinto, and means connected with and for operating said valve and for simultaneously forcing said bell against its seat.

977,786. Heating-Boiler. Alfred G. Cripps, Akron, O., assignor to Prudential Heating Co., Akron, O., a corporation of Ohio. A sectional heating boiler comprising

joined end and intermediate sections with side water legs, a down-draft grate formed with hollow grate bars made integral with and connecting the water legs of said intermediate sections, and an up-draft grate below the down-draft grate, and having vertical smoke flues formed between the water legs of adjacent sections connected with the space between said down-draft and up-draft grates and extending upwardly to horizontal flues in the upper part of the boiler by means of which smoke is made to pass longitudinally through said boiler to the front and then to the rear, substantially as described.

977,807. Valve. Gordon Land, Seattle, Wash., assignor to U. S. Flush Tank Co., Inc., Seattle, Wash., a corporation of Washington. In combination with a movable valve and the stem thereof an operating means for said valve including a lever formed with opposite convex surfaces and having an opening extending through the same and freely receiving said stem and a connection between said valve stem and said lever comprising a head secured to said valve stem and provided with spaced bearing surfaces for riding engagement with the convex surfaces of said lever.

977,860. Air-Inlet Box for Sewers. Emil Franklin, New York, N. Y. In a device of the character described, the combination with a casing open at its upper end and having an outlet in its bottom portion which is adapted to be connected with the sewerage system of a building, a removable grate arranged over the open end of said casing, a partition in said casing dividing the same into a compartment and into an air passage both of which communicate with the open end of said casing and with the outlet thereof, a grate between the lower end of said partition and the bottom of said casing for preventing dirt and foreign matter introduced into said compartment from passing through the outlet of said casing, and a deflector arranged above the mouth of the air passage in said casing.

977,896. Pipe-Wrench. Thomas James Nicholson, Kingston, Ontario, Canada. A pipe wrench comprising a pair of pivotally connected handles terminating in a circular head, pins secured to the head, jaws for detachable engagement with the head and adapted to engage the said pins, and springs secured to the handles and engaging the jaws to removably hold the same in the head.

977,937. Humidity-Regulator. Edward W. Comfort, Pensauken township, Camden county, N. J., assignor to Warren Webster & Co., a corporation of New Jersey. In a humidity regulator, the combination of two expansible elements having different coefficients of expansion, a lever having a connection with each of the expansible elements so as to be oscillated by the joint action of said elements when expanded unequally, means to maintain one of the elements in a wet condition, valve devices controlled by the lever, a motor controlled means for varying the atmospheric conditions, a pipe for supplying compressed air or gas to the motor and having a connection with the valve devices, and means for restricting the rapidity of flow of the air or gas to the motor and valve devices.

977,937. Push-Lever for Water-Closet Tanks. Raymond E. Crane, Cameron, W. Va. As an article of manufacture, an attachment for water closet tanks, comprising a nipple or bushing, means to secure the same in the tank wall, a push lever pivoted in said nipple, and a thumb-piece carried by the forward or operating end of said push lever immediately adjacent to and overlying the opening at the end of the nipple and directed obliquely to the axis of said lever.

977,950. Bath-Tub Head-Rest. Abraham Harrison, Los Angeles, Cal.

The Old Man's Reply.

Senator Tillman tells of an old man he used to know who drank too much. He said: "He was a fine old fellow in other respects, and it was pitiful to see him disgracing himself. One day I read him a long lecture on the sin of drunkenness. 'Water,' I said, 'is the thing. Stick to water, James.'

"'Well,' the old man answered, 'there's only one place in the Bible where a man asked for water, and I guess you know where he was.'"

To The Trade:-

We are prepared to give you the utmost value in heating requirements.

Our boilers are the Capitol, Furman Sun and Solar in both round and square.

In radiators we can furnish every heig ht, kind or shape needed, either slip nipple or screw nipple construction.

Every specialty needed for a heating plant can be supplied by us.

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United States Heater Co.
United States Radiator & Boiler Co.
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Classified Advertisements

Advertisements under this heading 4 cents per word per issue, address included. Remittance to be made with order. To insure insertion copy should be received not later than Wednesday morning.

Situations Wanted

SITUATION WANTED—BY A FIRST-class foreman, estimator and draftsman in plumbing, heating and ventilation, with 25 years' experience; can show good results, and give good references if wanted. Address No. 485, "Domestic Engineering," Chicago.

WANTED—POSITION AS BOOKKEEPER with a large plumbing establishment. Understand plumbing business. First-class references. Chicago preferred. Address No. 524, "Domestic Engineering," Chicago.

SITUATION WANTED — BY FIRST-class specialty salesman. Have had several years' experience; can show results; give best of references; sober, married and willing worker. Address No. 525, "Domestic Engineering," Chicago.

WANTED—POSITION AS BUYER AND Sales Manager or Branch Manager in wholesale plumbing and heating supply line, by man now employed in similar position on the Pacific Coast. Prefer eastern city. Address No. 526, "Domestic Engineering," 325 Dearborn St., Chicago.

POSITION WANTED—BY TRAVELING Salesman with 10 years' experience and acquaintance with plumbing and heating trade on Pacific Coast. A line of agencies. Commission basis. Address No. 530, "Domestic Engineering," Chicago.

WANTED—SITUATION BY MAN 32 years old; 17 years office experience from office boy to general manager; can change March 1st; branch house or home office. Can make good. Address No. 480, "Domestic Engineering," Chicago.

WANTED—POSITION BY A FIRST-class plumber and steam-fitter, a neat and quick lead-worker, a hustler and up-to-date. Can estimate from plans and plan work. Capable of taking charge of work, 18 years experience. Desires to locate in some growing city of the south or west. Strictly temperate and married. Address P. O. Box 129, Kirksville, Mo.

Help Wanted.

WANTED—CITY SALESMAN, HEATING line. Must state references and experience. Right position for right man. Address No. 484, "Domestic Engineering," Chicago.

WANTED—EXPERIENCED SALESMEN who are well known to the trade, to sell good line of house heating boilers and furnaces. Permanent positions for good men. Address, giving age, experience, salary expected, and territory covered. Address No. 486, "Domestic Engineering," Chicago.

WANTED — SALESMEN. IN ALL parts of the United States calling on plumbing, heating and hardware trade, to handle a staple side line; sell from catalog or pocket sample; good commission paid. Crawford Company, 838 S. Canal St., Chicago, Ill.

WANTED — SALESMAN FOR THE state of Illinois, Indiana, Western Ohio, Southern Michigan and Wisconsin to handle high-class plumbing supplies. Must have experience on road and good acquaintance with trade. In applying, give age, whether have covered this territory and all necessary references. Only a first-class man will be considered. Address No. 481, "Domestic Engineering," Chicago.

WANTED—SALESMEN ON COMMISsion basis to handle high-class plumbing supplies in the New England states, New York City, Pennsylvania, all of the southern states east of the Mississippi and south of the Ohio River. Prefer salesman now calling on the trade. Address No. 482, "Domestic Engineering," Chicago.

WANTED—HIGH-CLASS SPECIALTY salesman for New York City and vicinity. One with acquaintance and experienced in calling on architects and steam-fitters. Salary and commission. Address No. 479, "Domestic Engineering," Chicago.

WANTED—YOUNG MAN WITH EXperience in preparing advertising copy for the plumbing and heating trade. Address, giving full particulars, No. 471, "Domestic Engineering," Chicago.

For Sale

FOR SALE—PLUMBING,HEATING AND tinning business, also general hardware, at inventory; town of considerable size; books show best trade in city. Address No. 528, "Domestic Engineering," Chicago.

FOR SALE—THE OLDEST PLUMBING, Tinning and Heating establishment in town of 6,000 population, located in southern New York. Address No. 531, Domestic Engineering," Chicago.

FOR SALE—HALF INTEREST IN plumbing and heating business; prosperous town of eighteen thousand. For particulars address No. 517, "Domestic Engineering," Chicago.

FOR SALE—PLUMBING AND HEATING business, located central Iowa, established several years; will sell cheap; if interested address No. 512, "Domestic Engineering," Chicago.

Miscellaneous.

WANTED—A PARTNER WITH SOME capital to invest—sell heating and plumbing goods—new method. For particulars address No. 483, "Domestic Engineering," Chicago.

WANTED—PARTNER WITH A SMALL amount of capital to take an interest in an established heating and plumbing business. Address No. 520, "Domestic Engineering," Chicago.

WANTED—NEW SIDE LINES TO INtroduce to plumbing and heating trades in the west. Commission basis on first-class specialties. Can make good. Address 516, "Domestic Engineering," Chicago.

MANUFACTURERS—IF YOU HAVE A specialty of merit to introduce in the western trade, in the heating and plumbing line or in connection with the building line, we are prepared to take your agency, having thorough acquaintance with the trade. Address No. 508, "Domestic Engineering," Chicago.

Plumbing Schools

LEARN PLUMBING ON NEW BUILDings in four months. Tools furnished. Master Plumbers' Trade School, 3659 Finney Ave., St. Louis, Mo.

GOODS TO MANUFACTURE.

Parties having saleable specialties which they desire to have manufactured or marketed are invited to submit particulars. Address No. 333, "Domestic Engineering," Chicago.

WE PUBLISH:

A COMPLETE GUIDE TO TESTING PLUMBING. A full treatise showing the necessity of testing new and old work; methods of testing fully described; 7½ x 5¼ in.; seventeen illustrations. Postpaid, 25 cents.

DEAN'S SYSTEM OF GREENHOUSE HEATING by steam or hot water; used for years; convenient and reliable; makes greenhouse heating estimating very simple. Flexible cloth bound, 5½x7¾ in., 46 pp. Postpaid, $2.00.

MAKING THE BUSINESS PAY. Letters of John Burton, retired successful plumber and steamfitter, to his nephew still in business. Practical, instructive, entertaining, a guide to better business. Cloth bound, 5½x7¾ in.; 168 pp. Postpaid, $1.00.

SWIMMING POOLS. Their construction; cold and hot water supply; various methods of heating the water; directions as to selecting correct sizes of heaters. A practical guide to the subject. Over thirty illustrations; 6¼x4¾ inches. Postpaid, 50 cents.

SIZE OF FLOW AND RETURN STEAM MAINS. Contributions from thirty heating engineers of different cities in United States, giving current practice; full of practical advice and useful tables. Bound in boards, 6¼x4¼ in., 104 pp. Postpaid, 50 cents.

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